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draft environmental impact statement

traffic and recreational management

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ORIGINAL

GEORGE WASHINGTON

MEMORIAL PARKWAY/ VIRGINIA-MARYLAND-DISTRICT OF COLUMBIA

DRAFT ENVIRONMENTAL IMPACT STATEMENT
for
TRAFFIC AND RECREATIONAL MANAGEMENT
GEORGE WASHINGTON MEMORIAL PARKWAY
(Spout Run to Theodore Roosevelt Bridge)
and
SPOUT RUN PARKWAY
Virginia-Maryland-District of Columbia

Four alternatives are considered for improving traffic flow and safety on the study sections of the parkways. The alternatives range from minor safety improvements on the existing roadway to major structural changes.

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Prepared by
U.S. Department of the Interior / National Park Service
in coordination with
Federal Highway Administration / Eastern Direct Federal Division
Commonwealth of Virginia / Department of Highways and Transportation
Arlington County, Virginia / Department of Public Works
District of Columbia / Department of Public Works

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SUMMARY

George Washington Memorial Parkway, established by Congress in 1930, is a major unit of the national capital park system. It serves as a scenic gateway to Washington, D.C., and contains or connects numerous monuments, historic sites, and recreation areas in Virginia, Maryland, and the District of Columbia. The parkway and related sites form a valuable greenbelt along the Potomac River through much of the Washington metropolitan area.

The National Park Service is studying solutions to commuter traffic congestion and safety problems along the section of the GWMP roadway between Theodore Roosevelt Memorial Bridge and Spout Run Parkway and on Spout Run Parkway. Traffic levels are at capacity on the inbound lanes during the morning rush hours and on the outbound lanes during the evening rush hours. Traffic backups are common during the morning rush hours at the intersection of Spout Run Parkway and inbound GWMP and on the off-ramp to Roosevelt Bridge. During the evening rush hours, traffic congestion occurs on the on-ramps from Roosevelt and Key bridges and on the section of GWMP between Key Bridge and the Spout Run exit. The accident rate for this portion of GWMP within the study area, although not excessive, is higher than the rate for other sections of the parkway.

In seeking solutions to these commuter traffic problems, the National Park Service must also fulfill its responsibilities to preserve and protect the scenic, natural, cultural, and recreational values of the parkway. The study area section of the parkway is a narrow band of parkland tucked between Arlington and the Potomac River, and it is extremely susceptible to the loss of its parklike character if its thin vegetative buffer is disturbed.

Four alternatives for roadway changes have been developed and evaluated: Alternative A includes actions that are ongoing or programmed for implementation regardless of what other course of action might be taken. These include the rehabilitation of the existing road base and surface and safety improvements such as reflective markings, guardrails, signing, and skid-resistant surfacing. Alternative B includes the lengthening of on-ramps and off-ramps and a new third continuous lane on the outbound roadway between Key Bridge and Spout Run. Alternative C adds a new third continuous inbound lane between Spout Run and Key Bridge and a fourth outbound lane through this section. Alternative D adds third continuous inbound and outbound lanes between Key and Roosevelt bridges. The alternatives also address possible improvements to the Lorcom Lane/Spout Run intersection, improvements to Rosslyn Circle, and various ways to access Rossyln and Key Bridge from the inbound parkway.

In the public meetings and in written comments to date, the public expressed general objections to the options of closing or placing vehicular restrictions on Spout Run Parkway during the morning and evening rush

hours. The idea of participating in voluntary carpool/vanpool programs received widespread support. Improved mass transit was requested by many as an alternative to either mandatory restrictions or expansion of the parkway's vehicular capacity through a major construction program.

Reaction to options for major parkway construction was mixed. A few people supported major construction. However, many people expressed concerns about the loss of parkway scenic and environmental qualities if major construction was undertaken and felt that if additional lanes were added, they would attract new users until the parkway segment once again reached capacity. The year 1990 and 2000 traffic data support their contention. No alternative would improve more than two of the eight locations within the study area that are currently "capacity deficient" (locations where the level of service is E or F or where the theoretical capacity of the roadway is exceeded). Most of these locations would remain capacity deficient through the year 2000 regardless of the amount of parkway improvements or lane additions proposed by the individual alternatives.

For most segments alternative A would result in the longest travel times. Alternatives B, C, and D generally would reduce congestion and shorten travel times compared to alternative A. The potential for accidents would be reduced over the existing situation in all alternatives, including alternative A, by improvement of the roadway surface, signing, and markings. Alternatives B, C, and D would additionally provide for safer traffic merging throughout the study segment and for safer traffic weaving on outbound GWMP between Key Bridge and Spout Run. The primary safety benefits of alternatives B, C, and D would be the likely reduction of rear-end, run-off-the-road, and side-swipe accidents. Concerning environmental impacts, alternative A would cause no long-term negative impacts; however, alternatives B through D would cause increasingly severe impacts on the parkway's scenic, recreational, and natural values. Alternative B would result in low to moderate impacts. Alternatives C and D would involve a considerable increase in the road surface, extensive cut and fill slopes, and the removal of critical vegetation along narrow parkway edges. Some impacts could be mitigated through revegetation, but many others would result in irreparable damage to the scenic character of this segment of the parkway.

Implementation of any alternative contained in this document will require coordination among the National Park Service, the Federal Highway Administration, the Arlington County Department of Public Works, the District of Columbia Department of Public Works, and the Virginia Department of Highways and Transportation.

Construction costs for the four alternatives range from $10.3 million for alternative A up to $31.8 million for alternative D.

Traffic movement, traffic safety, environmental impacts, and project cost were the primary elements considered in the selection of a preferred alternative. Alternative B was selected because it would improve traffic movement and safety at a lower cost and with significantly less adverse environmental impact than alternatives C or D.

Summary Comparison of the Effects of the Alternatives

	Alternative A	Alternative B (Preferred Alternative)	Alternative C	Alternative D
Key features	. resurfacing and basic safety improvements	. longer deceleration and acceleration lanes . new continuous lane outbound between Key Bridge and Spout Run	. additional lanes both inbound and outbound beween Spout Run and Key Bridge . new stacking lane on inbound GWMP prior to Roosevelt Bridge	. additional lanes both inbound and outbound between Spout Run and Roosevelt Bridge . new ramp from inbound parkway to Rosslyn Circle
Traffic conditions	. better travel surface . continued traffic merging and weaving problems . continued congestion during peak hours	. better travel surface . improvement to traffic merging problems . some improvement to traffic weaving outbound . continued congestion during peak hours	. better travel surface . good access to Rosslyn (and US 50) . improvement to traffic merging and weaving problems . added congestion at Key Bridge during morning peak hours . continued congestion during peak hours	. better travel surface . improvement to traffic merg- merging and weaving problems . added congestion at Key Bridge during morning peak hours . continued congestion during peak hours
Total number of capacity-deficient locations in year 2000	6 of 6 locations	6 of 6 locations	6 of 8 locations	7 of 8 locations
Travel times	. longest travel times on most segments	. shorter travel times than A inbound on GWMP but longer than A inbound on Spout Run . second shortest travel times outbound	. shorter travel times than B inbound . Slightly longer travel times than B outbound	. shorter travel times than C inbound . shorter travel times than B outbound
Parkway safety	. improved due to better surface, signing, and guardrails	same as A plus . safer traffic merging conditions	same as A and B plus . more space for traffic weaving . safer intersection provided by Lorcom Lane traffic signal	. same as C
Cost of improvements (1985 dollars)	$10,269,000	$16,513,000	$21,669,000	$31,813,000
Cultural values	. no negative impact	. moderate potential for disturbance of archeological resources . minor to moderate impact to historic parkway	. somewhat higher potential for disturbance of archeological resources . major impact to historic parkway	. same as C

	Alternative A	Alternative B (Preferred Alternative)	Alternative C	Alternative D
Natural values	. no negative impact	. minor impact due to some loss of vegetation	moderate impact due to . disturbance of river edge and floodplain along outbound GWMP . vegetation loss due to stacking lane	moderate to major impact due to . disturbance of river edge and floodplain along outbound GWMP . sizable cut and fill slopes and loss of vegetation
Recreational values	. positive impact due to improved road surface	positive impact due to . improved road surface . improved Rosslyn Circle . bike trail improvements . improved visitor contact	same as B except: . negative impact on Potomac River Trail caused by four lanes around piedmont rock on outbound GWMP . pleasure driving diminished by loss of scenic values	same as B except: . negative impact on Potomac River Trail caused by four lanes around piedmont rock on outbound GWMP . pleasure driving greatly diminished by loss of scenic values . Little River shoreline recreation activity confined to narrower area
Scenic values	. no negative impact	. minor negative impact due to reduction in vegetative edge . positive impact due to enhancement of Rosslyn Circle	. major negative impact due to stacking lane, loss of vegetative edge, and more paved surfaces . positive impact due to enhancement of Rosslyn Circle	. major negative impact due to loss of vegetative edge, extensive paved surfaces, and cut and fill slopes and retaining walls . positive impact due to enhancement of Rosslyn Circle
Overall retention of parkway character	. retention of parkway character	. minor alteration of parkway character	. major alteration of parkway character	. severe alteration of parkway character
Impact summary	. improved safety at the lowest cost and impact but continued poor traffic merging and continued peak-hour congestion	. improved safety and traffic merging at moderate cost and minor impact with continued peak-hour congestion	. improved safety and traffic merging/weaving at moderate cost and major impact with continued peak-hour congestion	. improved safety and traffic merging/weaving at the highest cost and impact with continued peak-hour congestion

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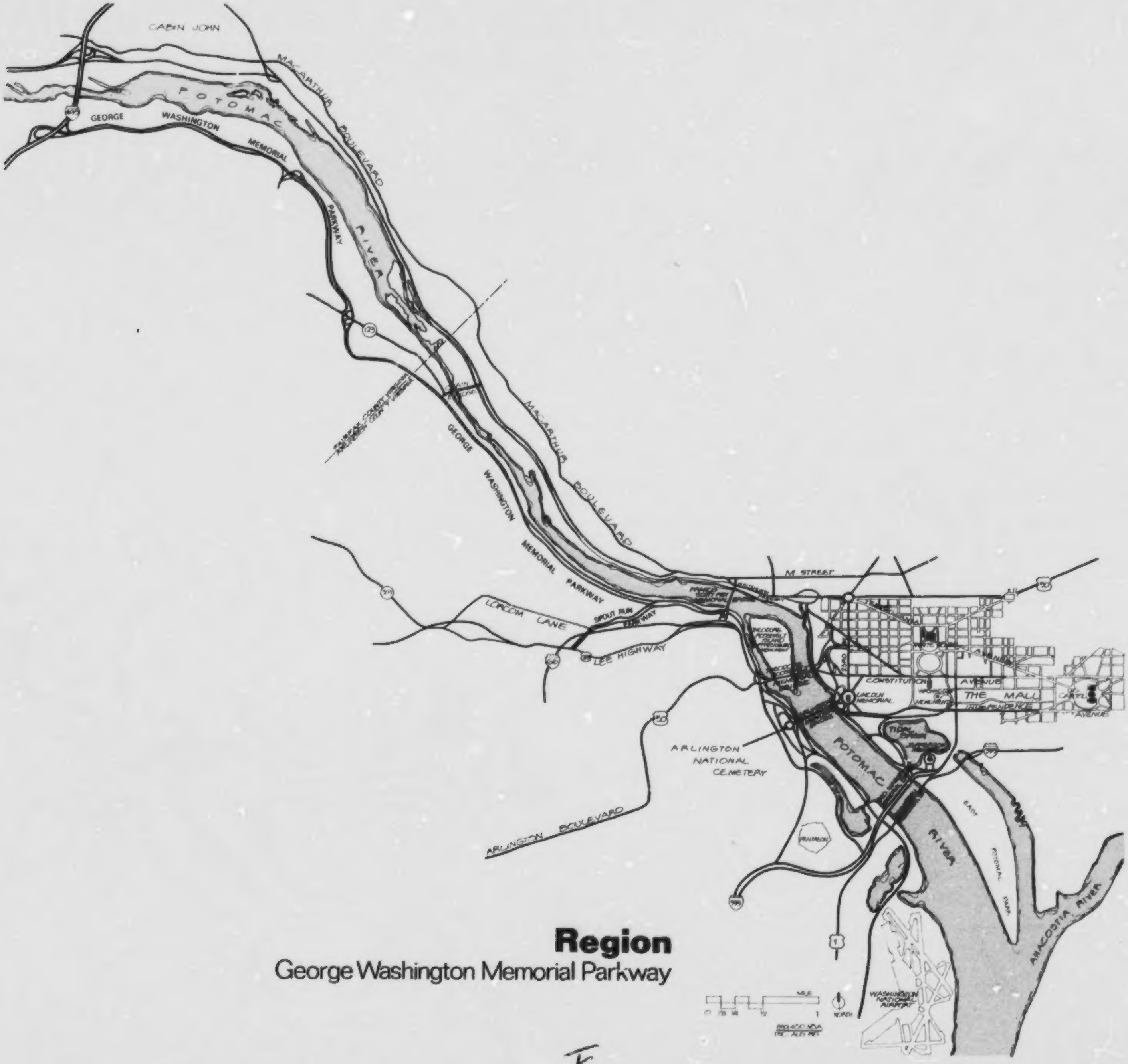

Region
George Washington Memorial Parkway

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PURPOSE OF AND NEED FOR THE ACTION

Action is needed to address traffic problems along a 1.6-mile section of George Washington Memorial Parkway between Theodore Roosevelt Memorial Bridge (I-66) and Spout Run Parkway; the study area includes the 1.0-mile Spout Run Parkway (from its intersection with GWMP to its western terminus before Lee Highway) and Rosslyn Circle. The completion of I-66 and of the Metropolitan Washington Urban Mass Transit System (METRO) in Arlington and Fairfax counties, Virginia, was to significantly reduce transportation use and management problems on GWMP and Spout Run Parkway. However, continued population growth and greatly expanded commercial development in these two counties has prevented the realization of that forecast. Because of its location and proximity to other regional transportation systems, GWMP not only serves as a scenic memorial approach to the nation's capital, it also becomes a congested commuter route during the morning and evening rush hours. Like most of the highways in the metropolitan area, the study area roadways now carry traffic volumes that exceed design capacity. The heavy rush hour traffic, the high traffic speeds during nonpeak periods, and the condition of the road surface all contribute to a frequent occurrence of rear-end, sideswipe, and run-off-the-road accidents. The purpose of the action is to reduce traffic congestion and improve safety while ensuring the long-term preservation of the parkway's scenic values, natural and cultural resources, and recreational opportunities.

Within the study area morning congestion begins at the intersection of Spout Run and Lorcom Lane. Currently, the traffic turning left from Lorcom Lane onto inbound Spout Run is accommodated by closing the outbound portion of the Spout Run Parkway and allowing uninterrupted inbound turns. Where inbound Spout Run merges into inbound GWMP, long backups occur on both parkways. No exit to Key Bridge and Rosslyn is allowed during the morning rush hour because neither Rosslyn Circle, Key Bridge, nor the connecting streets in Georgetown can accommodate this traffic; backups on GWMP and increased traffic congestion in Arlington would occur. Traffic headed into the District must therefore use the Roosevelt Bridge, which is also heavily congested. This results in substantial traffic backups from the bridge onto the parkway.

In the evening, high outbound traffic volumes on Roosevelt Bridge create congestion on the bridge, on the on-ramp to GWMP, and on the outbound parkway. The congestion is aggravated at the on-ramp from Key Bridge because of the high volume of outbound vehicles entering the parkway at this location. Traffic remains highly congested to the Spout Run exit because of traffic merging and weaving problems.

The traffic congestion on the parkway is part of a more general transportation network problem that occurs throughout the greater metropolitan area. Consequently, any proposal to improve traffic flow on GWMP must be developed in the context of how traffic patterns would shift throughout the overall network of connecting roadways and streets.

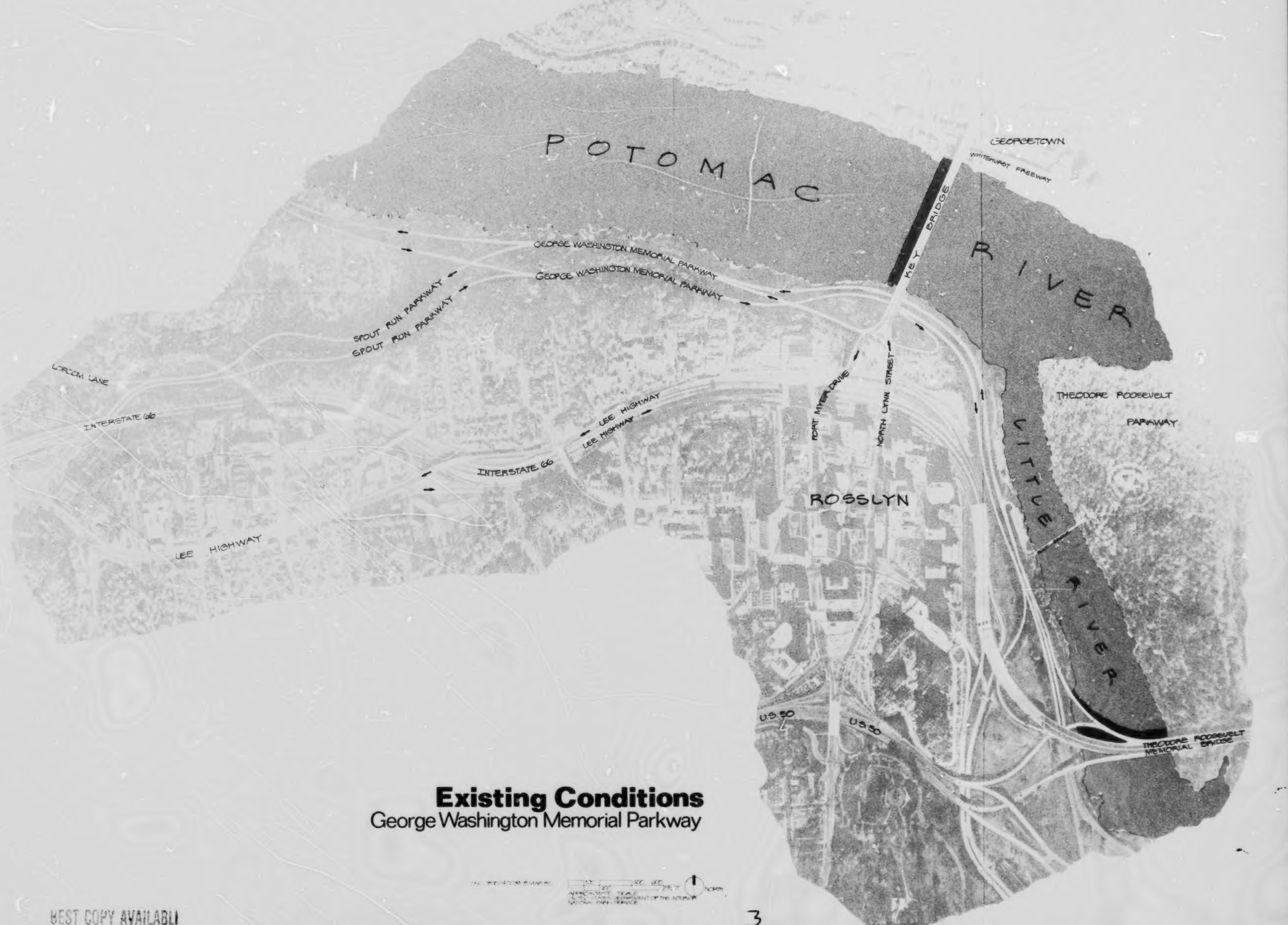
For example, Key and Roosevelt bridges, which link the study area section of GWMP with city streets in Washington and Rosslyn, also carry rush-hour traffic volumes that exceed their design capacities, and this creates traffic backups on the parkway. The roadway intersections at the east ends of these bridges (M Street at Key Bridge and 23rd Street and Constitution Avenue at Roosevelt Bridge) are a long-term fixed constraint on capacity, and the greatest morning traffic congestion occurs at these intersections.

The heavy traffic volumes carried on GWMP, along with high speeds and bad weather conditions, are a contributing factor to accidents. Rear-end collision accidents are the most frequently recorded type within the study area, and they occur primarily during peak traffic hours. However, all three fatal accidents during the past three years in the study area occurred at night.

In addition to traffic congestion and highway safety, GWMP presents additional concerns that are not generally shared by other regional roadways. These are the needs to perpetuate the visual qualities that distinguish it as a parkway, to protect the scenic values of the Potomac River valley, and to provide recreational and other park experiences for the local, regional, and national public. Over the years, there has been an erosion of the pleasurable aspects of parkway use. Increasing commuter traffic congestion has contributed to this decline. However, reducing this traffic problem will not reverse the decline unless it is accomplished in a manner that also protects the parkway's aesthetic and recreational values.

This document combines planning information from previous Federal Highway Administration and Arlington County traffic studies and new information developed by the National Park Service (see the "Consultation and Coordination" section). It assesses four feasible alternatives to determine their environmental impacts, focusing on the effects on regional traffic flow, highway safety, and the visual qualities of the parkway.

Alternative B was selected as the preferred alternative because it would improve traffic movement and safety at a lower cost and with fewer adverse environmental impacts than alternatives C or D. However, the final proposal may be revised based on comments received from the public and from local, state, and other federal agencies. The proposed action identified in the final EIS may be a modification of the currently preferred alternative, another alternative, or a combination of elements from alternatives B, C, and D, and it may include new elements suggested during public review.



Existing Conditions
George Washington Memorial Parkway

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Alternatives including the Proposed Action

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ALTERNATIVE A

Alternative A is a continuation of existing management. Road base reconstruction and road resurfacing, which are underway, would be completed. Additionally, safety improvements, including reflective markings, guardrails, signing, and placement of skid-resistant surfacing, would be added. Rosslyn Circle would be improved by removal of the old bus turnarounds, rehabilitation of the roadway, and new landscaping to complement the proposed adjacent park above I-66. A study would be undertaken to determine what role, if any, the National Park Service could play in promoting carpool/vanpool use in the area. For example, existing NPS parking lots, which are heavily used by parkway visitors on weekends, might also be used for park-and-ride lots during the week.

In summary, the three main components of alternative A are

scheduled road base reconstruction and road resurfacing

safety improvements, such as reflective markings, guardrails, signing, and skid-resistant surfacing

improvement of Rosslyn Circle

These actions also would be common to alternatives B, C, and D.

ALTERNATIVE B (PREFERRED ALTERNATIVE)

Alternative B, the preferred alternative, involves structural roadway changes to improve traffic flow and safety. The merge lane between inbound Spout Run and GWMP, and all of the existing acceleration and deceleration lanes, both inbound and outbound, would be lengthened to allow drivers more space and time to change lanes as they enter and exit the parkway. In addition, a new continuous lane, approximately 1,300 feet long, would be constructed on outbound GWMP between the on-ramp from Key Bridge and the Spout Run exit. The new lane would reduce congestion on that section of the roadway and facilitate traffic weaving (movement to the right by traffic entering from Key Bridge and movement to the left by traffic exiting at Spout Run).

The Lorcom Lane/Spout Run intersection would be reconstructed to add a left turn lane for traffic turning left from inbound Spout Run to Lorcom Lane. This would allow the obliteration of the turnaround loop on the inbound Spout Run Parkway. The left turn movement would be prohibited during the morning rush hours so that traffic turning left onto Lorcom Lane would not interfere with the heavier traffic turning left from Lorcom Lane onto inbound Spout Run Parkway. Also, the outbound lanes on Spout Run would remain closed west of the Lorcom Lane intersection during the morning rush hours so that through-traffic would not interfere with the traffic turning left from Lorcom Lane onto inbound Spout Run. Through-traffic on the inbound portion of Spout Run Parkway would be restricted to the outside lane through the intersection, leaving the inside lane open to receive the Lorcom Lane traffic. Inbound traffic would be funneled into a single lane again just before merging with GWMP traffic. The longer merge lane, approximately 1,600 feet long, for Spout Run traffic merging onto GWMP would allow the removal of the U.S. Park Police officer from that junction during the morning peak hours.

The GWMP off-ramp to Key Bridge/Rosslyn Circle would be reconstructed to merge into the I-66 off-ramp to Lee Highway just before the intersection with North Lynn Street. Traffic exiting GWMP would thus be able to turn right onto Key Bridge or continue through the Lee Highway/Fort Myer Drive intersection. However, the GWMP off-ramp to Key Bridge/Rosslyn Circle would remain closed during the morning rush hours to avoid adding traffic to the already congested conditions at Rosslyn Circle, Key Bridge, and connecting streets in Georgetown, which would cause backups onto GWMP.

Rosslyn Circle would be improved as described for alternative A. In addition, the left-turn lane from North Lynn Street to the on-ramp for outbound GWMP would be widened and realigned.

The entrance to the Theodore Roosevelt Island parking lot would be relocated, and a one-way in-and-out traffic flow would be established. Deceleration and acceleration lanes would be lengthened to improve the flow of traffic in and out of the parking area.

In summary, alternative B contains all elements of alternative A plus

Inbound

reconstruction of the Lorcom Lane/Spout Run intersection

obliteration of the inbound turnaround on Spout Run

longer merge lane from Spout Run to GWMP

longer deceleration lanes for GWMP off-ramps to Key and Roosevelt bridges

reconstruction of the off-ramp to Key Bridge/Rosslyn, adding direct access to Lee Highway

reconstruction of Rosslyn Circle

Outbound

longer acceleration lane for GWMP on-ramp from Roosevelt Bridge

access improvements at Theodore Roosevelt Island parking lot

new third continuous lane between the on-ramp from Key Bridge and Spout Run exit

new deceleration lane at the Spout Run turnaround

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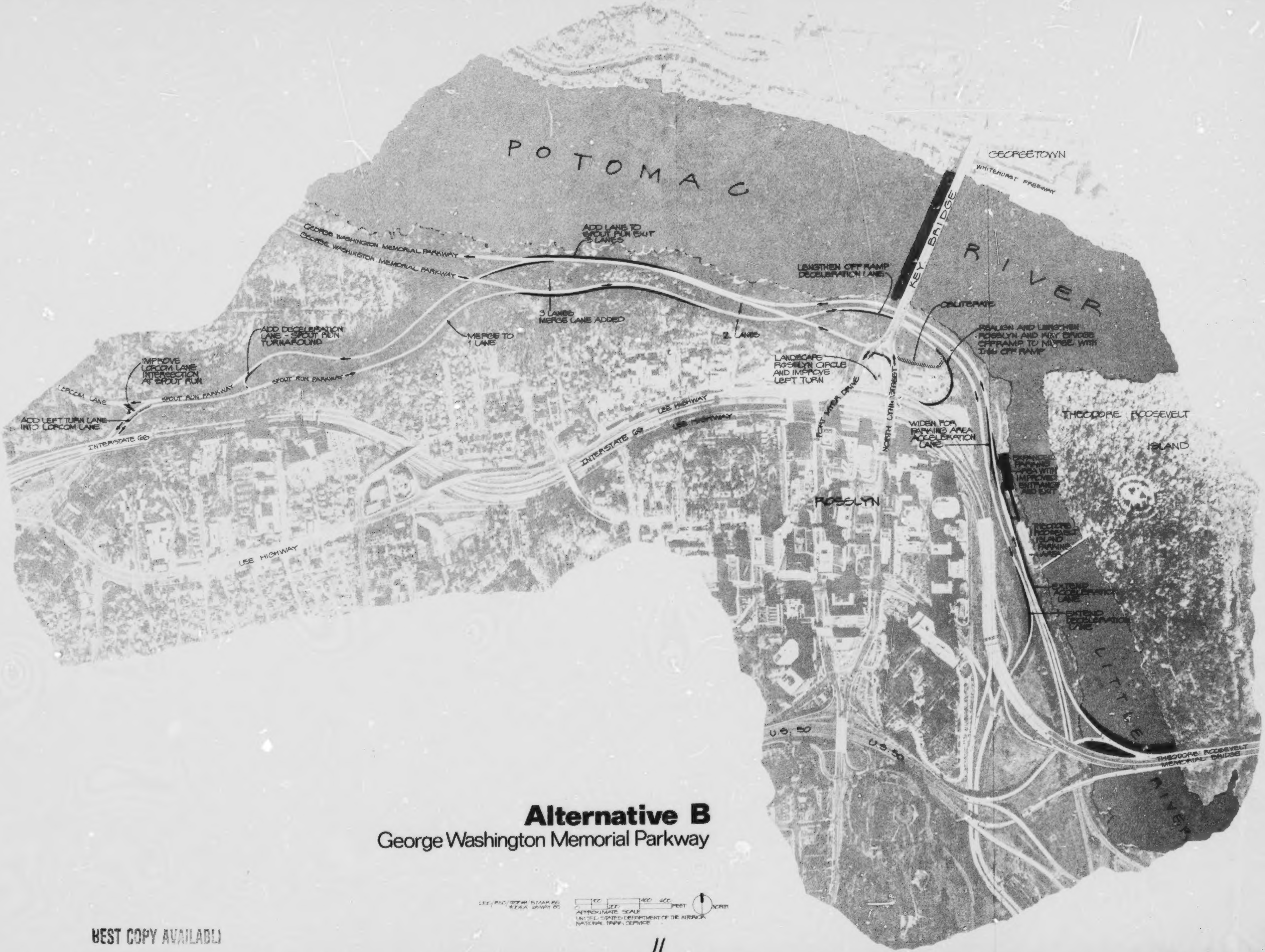
POTOMAC RIVER
GEORGETOWN
WHITEHURST FREEWAY
KEY BRIDGE
GEORGE WASHINGTON MEMORIAL PARKWAY
GEORGE WASHINGTON MEMORIAL PARKWAY
ADD LANE TO SPOUT RUN EXIT 3 LANES
3 LANES MERGE LANE ADDED
2 LANES
MERGE TO 1 LANE
ADD DECELERATION LANE - SPOUT RUN TURNAROUND
IMPROVE LORCOM LANE INTERSECTION AT SPOUT RUN
LORCOM LANE
SPOUT RUN PARKWAY
SPOUT RUN PARKWAY
ADD LEFT TURN LANE INTO LORCOM LANE
INTERSTATE 66
INTERSTATE 66
LEE HIGHWAY
LEE HIGHWAY
LEE HIGHWAY
LENGTHEN OFF RAMP DECELERATION LANE
OBLITERATE
REALIGN AND LENGTHEN ROSSLYN AND KEY BRIDGE OFFRAMP TO MERGE WITH I-66 OFF RAMP
LANDSCAPE ROSSLYN CIRCLE AND IMPROVE LEFT TURN
FORT MYER DRIVE
NORTH LYNN STREET
WIDEN FOR PARKING AREA ACCELERATION LANE
EXPANDED PARKING AREA WITH IMPROVED ENTRANCE AND EXIT
THEODORE ROOSEVELT ISLAND PARKING AREA
EXTEND ACCELERATION LANE
EXTEND DECELERATION LANE
THEODORE ROOSEVELT ISLAND
ROSSLYN
U.S. 50
U.S. 50
LITTLE RIVER
THEODORE ROOSEVELT MEMORIAL BRIDGE
0 100 200 400 600 FEET
APPROXIMATE SCALE
NORTH
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Alternative B

George Washington Memorial Parkway

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ALTERNATIVE C

Alternative C involves additional changes to those described for alternative B. The Spout Run/Lorcom Lane intersection would be reconstructed to add a third lane for left turns from inbound Spout Run to Lorcom Lane, as described for alternative B. In addition a traffic signal would be installed at the intersection, and outbound Spout Run would no longer be closed west of Lorcom Lane during the morning rush hour. Inbound Spout Run traffic would be funneled into a single lane before merging with GWMP traffic, as in alternative B. Unlike alternative B, which would only lengthen the merge lane, alternative C would add a new continuous inbound lane, approximately 3,400 feet long, to GWMP between Spout Run and Key Bridge.

The Rosslyn Circle would be reconstructed as described for alternative B. The inbound GWMP off-ramp to Key Bridge would also be reconstructed and opened for use during the morning rush hours. A new stacking lane approximately 2,600 feet long would replace the existing off ramp for the Roosevelt Bridge. The redesigned ramp would be elevated and would exit GWMP just past Key Bridge, extending into the area between I-66 and GWMP. The new off-ramp and stacking lane would free the through-lanes on inbound GWMP from traffic waiting to get onto Roosevelt Bridge. Currently, during the morning peak hours, lengthy backups often occur on GWMP because of traffic congestion on the bridge. Beyond the exit, the ramp would split into two lanes. The left lane would feed into the Roosevelt Bridge, and the right lane would merge into outbound US 50, providing an alternate method of access to the Rosslyn area from that proposed in alternative B.

Access to the Theodore Roosevelt Island parking lot would be improved, and the acceleration lane for the GWMP on-ramp from Roosevelt Bridge would be lengthened, both as in alternative B.

Two new outbound lanes, both about 2,000 feet long, would be added to the section of GWMP between the Key Bridge on-ramp and the Spout Run exit. This would further alleviate traffic congestion and reduce the traffic weaving problem in this segment of the parkway. North of the Spout Run exit on outbound GWMP, a short (1,000-foot) merge lane would be added to ease the transition back to two lanes, and the bridge at that location would be reconstructed to accommodate the merge lane.

On outbound Spout Run, the free-flowing off-ramp from the parkway to Lorcom Lane would be redesigned to reduce the speed of traffic exiting Spout Run and thus allow for a safer entrance to the subdivision north of Spout Run.

In summary, alternative C contains all elements of alternative A plus

> Inbound
> reconstruction of the Lorcom Lane/Spout Run intersection and installation of a traffic signal at that intersection

obliteration of the inbound turnaround on Spout Run

new continuous lane from Spout Run to the off-ramp for Key Bridge/Rosslyn

reconstruction of the off-ramp to Key Bridge, which would be reopened for use during morning rush hours

reconstruction of Rosslyn Circle

construction of a new stacking lane to replace the off-ramp to Roosevelt Bridge and to provide direct access to US 50 into Rosslyn

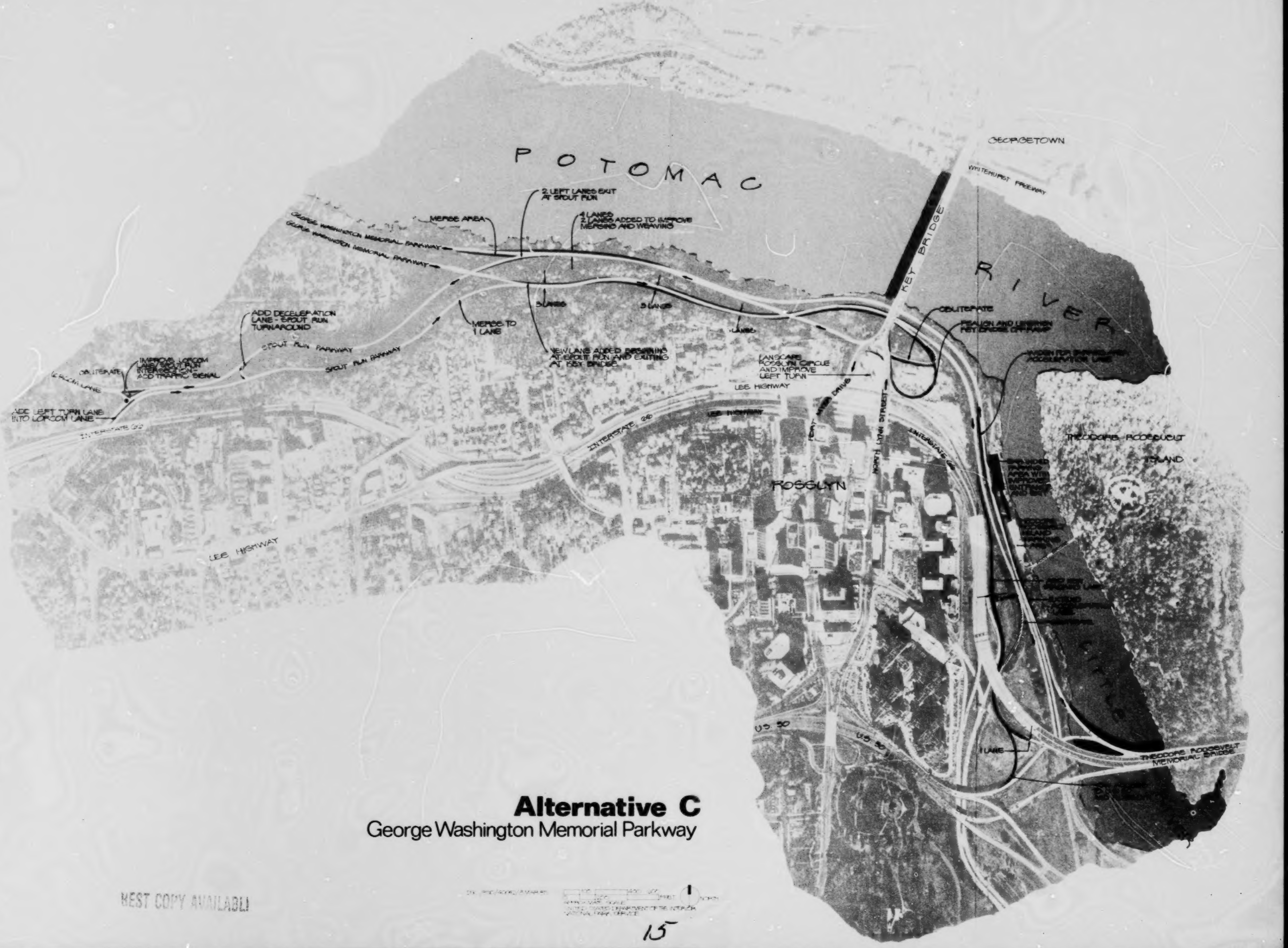
Outbound
longer acceleration lane for GWMP on-ramp from Roosevelt Bridge

access improvements at Theodore Roosevelt Island parking lot

new third and fourth continuous lanes between the GWMP on-ramp from Key Bridge and the Spout Run exit

new merge lane north of the Spout Run exit

redesign of the outbound off-ramp from Spout Run Parkway to Lorcom Lane


POTOMAC RIVER
GEORGETOWN
WHITEHURST FREEWAY
KEY BRIDGE
2 LEFT LANES EXIT AT SPOUT RUN
MERGE AREA
4 LANES
2 LANES ADDED TO IMPROVE MERGING AND WEAVING
GEORGE WASHINGTON MEMORIAL PARKWAY
GEORGE WASHINGTON MEMORIAL PARKWAY
3 LANES
3 LANES
LANES
ADD DECELERATION LANE - SPOUT RUN TURNAROUND
MERGE TO 1 LANE
NEW LANE ADDED BEGINNING AT SPOUT RUN AND EXITING AT KEY BRIDGE
SPOUT RUN PARKWAY
SPOUT RUN PARKWAY
IMPROVE LORCOM LANE/SPOUT RUN INTERSECTION - ADD TRAFFIC SIGNAL
OBLITERATE
LORCOM LANE
ADD LEFT TURN LANE INTO LORCOM LANE
INTERSTATE 66
INTERSTATE 66
OBLITERATE
REALIGN AND LENGTHEN KEY BRIDGE OFF RAMP
LANSCAPE ROSSLYN CIRCLE AND IMPROVE LEFT TURN
LEE HIGHWAY
LEE HIGHWAY
LEE HIGHWAY
FORT MYER DRIVE
NORTH LYNN STREET
INTERSTATE 66
ROSSLYN
THEODORE ROOSEVELT ISLAND
EXPANDED PARKING AREA WITH IMPROVED ENTRANCE AND EXIT
U.S. 50
U.S. 50
1 LANE
THEODORE ROOSEVELT MEMORIAL BRIDGE
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
NORTH

Alternative C
George Washington Memorial Parkway

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ALTERNATIVE D

Alternative D proposes the most structural changes to the parkway segments. Full third lanes of pavement would be constructed both inbound and outbound between Spout Run and Roosevelt Bridge. The total length of the inbound lane would be 5,900 feet, and the outbound lane would be 6,300 feet. A fourth lane approximately 2,000 feet long would be added outbound between Key Bridge and Spout Run, as described for alternative C. Access to the Rosslyn area from inbound GWMP would be facilitated by a new off-ramp just east (riverside) of the Marriott Hotel. The Rosslyn Circle would be reconstructed as described for alternative B. The off-ramp to Key Bridge would be reconstructed and reopened for use during the morning rush hours, as in alternative C. Changes to the Spout Run Parkway and the Spout Run/Lorcom Lane intersection would be the same as described for alternative C.

In summary, alternative D contains all elements of alternative A plus

Inbound
reconstruction of the Lorcom Lane/Spout Run intersection and installation of a traffic signal at that intersection

obliteration of the inbound turnaround on Spout Run

new third continuous lane from Spout Run to the off-ramp for Roosevelt Bridge

new off-ramp to the Rosslyn Circle area (right exit)

reconstruction of the off-ramp to Key Bridge, which would be reopened for use during the morning rush hours

reconstruction of Rosslyn Circle

Outbound
access improvements at Theodore Roosevelt Island parking lot

new third continuous lane between the on-ramp from Roosevelt Bridge and the Spout Run exit

new fourth continuous lane between the on-ramp from Key Bridge and the Spout Run exit

new merge lane north of the Spout Run exit

redesign of the outbound off-ramp from Spout Run Parkway to Lorcom Lane

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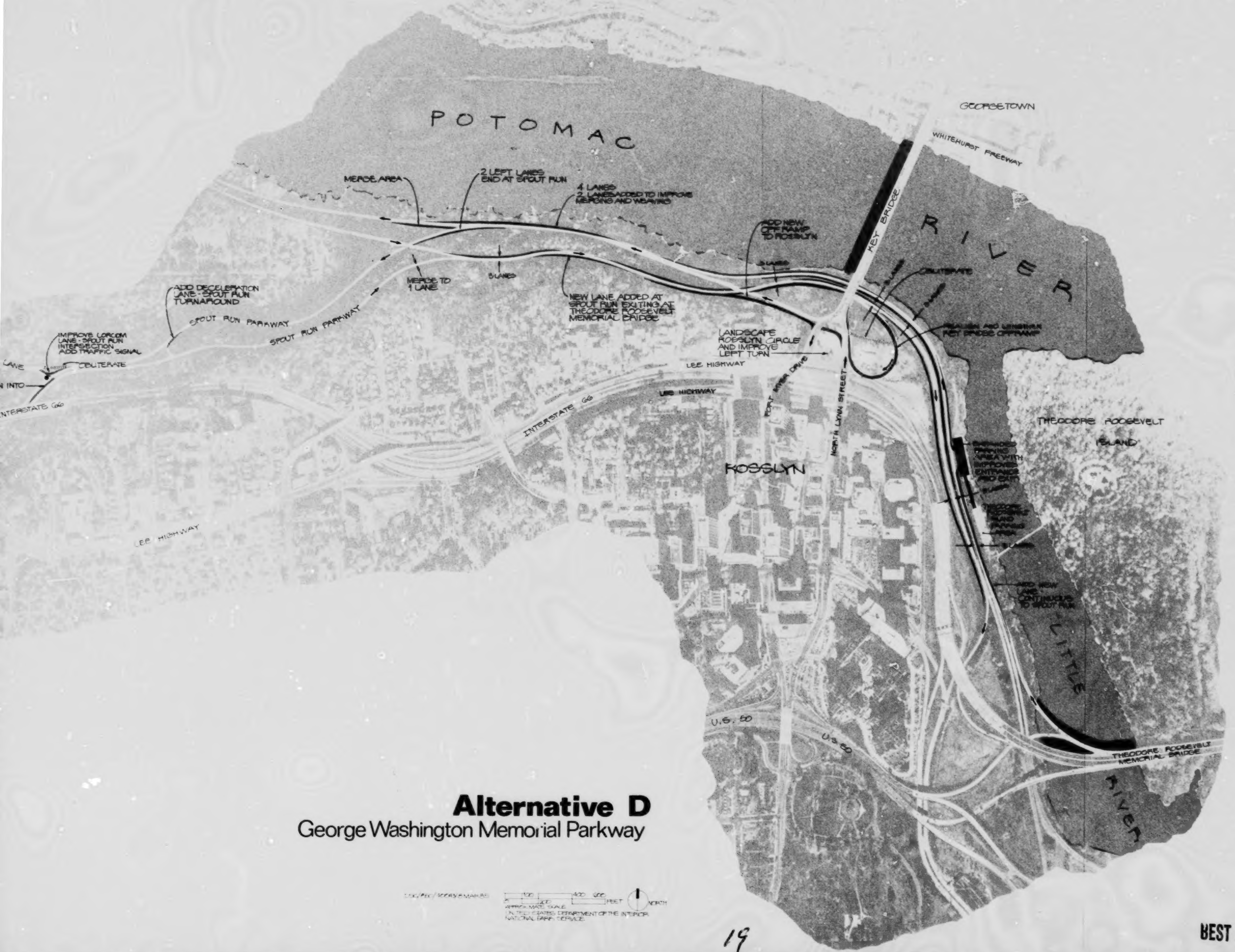
POTOMAC RIVER
GEORGETOWN
WHITEHURST FREEWAY
KEY BRIDGE
MERGE AREA
2 LEFT LANES END AT SPOUT RUN
4 LANES 2 LANES ADDED TO IMPROVE MERGING AND WEAVING
MERGE TO 1 LANE
3 LANES
NEW LANE ADDED AT SPOUT RUN EXITING AT THEODORE ROOSEVELT MEMORIAL BRIDGE
ADD DECELERATION LANE - SPOUT RUN TURNAROUND
SPOUT RUN PARKWAY
SPOUT RUN PARKWAY
IMPROVE LORCOM LANE - SPOUT RUN INTERSECTION ADD TRAFFIC SIGNAL
LANE
OBLITERATE
N INTO
INTERSTATE 66
ADD NEW OFF RAMP TO ROSSLYN
3 LANES
OBLITERATE
REALIGN AND LENGTHEN KEY BRIDGE OFF RAMP
LANDSCAPE ROSSLYN CIRCLE AND IMPROVE LEFT TURN
LEE HIGHWAY
LEE HIGHWAY
INTERSTATE 66
FORT MYER DRIVE
NORTH LYNN STREET
ROSSLYN
THEODORE ROOSEVELT ISLAND
ENLARGED PARKING AREA WITH IMPROVED ENTRANCE AND EXIT
3 LANES
THEODORE ROOSEVELT ISLAND PARKING AREA
3 LANES
ADD NEW LANE CONTINUOUS TO SPOUT RUN
LITTLE RIVER
LEE HIGHWAY
U.S. 50
U.S. 50
THEODORE ROOSEVELT MEMORIAL BRIDGE
[illegible]
0 100 200 400 600 FEET
APPROXIMATE SCALE
NORTH
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Alternative D

George Washington Memorial Parkway

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OPTIONS CONSIDERED BUT NOT INCLUDED IN THE ALTERNATIVES

The following options were considered but rejected during formulation of the alternatives, for the reasons noted.

HOV-3 restrictions on Spout Run Parkway during the morning and evening rush hours. Mandatory peak-hour high-occupancy-vehicle restrictions would be placed on Spout Run traffic. This would divert low-occupancy Spout Run traffic away from GWMP and reduce the total peak-hour volumes in the study area without affecting the inbound GWMP traffic prior to Spout Run. This option was dropped from further consideration because of the widespread public opposition expressed in the public meetings, because it would be difficult to enforce, and because it would restrict cars from Arlington County with less than three persons desiring to travel on GWMP yet not restrict other parkway users.

HOV-3 restrictions on the off-ramp from GWMP to Key Bridge during the morning rush hours. The off-ramp from GWMP to Key Bridge would be reopened for morning rush hour traffic, but HOV restrictions would be enforced to help control the volume of traffic entering Key Bridge. This option was dropped from consideration because it would be very difficult to enforce given the short length of the ramp. Also, any traffic using the bridge during the morning rush hours would increase the congestion at Rosslyn Circle, Key Bridge, and connecting streets in Georgetown and cause backups onto GWMP.

HOV-3 restrictions on the off-ramp from GWMP to Theodore Roosevelt Bridge during the morning rush hours. This option was dropped from consideration because it would interrupt existing traffic patterns, channel additional traffic onto Arlington Memorial Bridge (which is already at capacity during the morning rush hours), and unreasonably interfere with general public use of the ramp.

Access to the Rosslyn area through a new tunnel beneath I-66. A new exit from inbound GWMP just beyond Key Bridge would lead to a tunnel beneath all four lanes and the ramps of I-66, a distance of approximately 600 feet. The tunnel would feed into North Arlington Ridge Road, which would be changed to a one-way southbound street. A traffic signal would be installed at the intersection of North Arlington Ridge Road and Wilson Boulevard. GWMP traffic could either follow Wilson Boulevard into Rosslyn or continue south on Virginia state route 110. This option was dropped from consideration because of its cost and impacts on the Rosslyn area street system.

Elimination of ramp from GWMP to Key Bridge. This option was dropped because the ramp is needed to properly serve parkway users during the nonpeak hours. Elimination of the ramp would require people to find alternate routes to Rosslyn and Georgetown. People traveling to Rosslyn would be severely inconvenienced.

Closure of GWMP on-ramp from Key Bridge during afternoon rush hours. This option was dropped because it would deny parkway access from Georgetown and Rosslyn during the afternoon peak period, further overload the Roosevelt Bridge during the afternoon rush period, and increase use of Lee Highway. (Lee Highway is not now at capacity during this time period.)

Commuter Fee. Charging a commuter fee for parkway users was rejected because it would be difficult and costly to administer and enforce and because it would be complicated by the fact that many parkway users are visitors to the nation's capital.

Reversible Lanes. The concept of reversible lanes would not be appropriate for GWMP because of the physical design characteristics of the parkway and the limited number and design of access points.

Parkway Lighting. A recommendation to place lights along the parkway was considered incompatible with the aesthetic qualities of the parkway. However, improved reflective markings should address much of this concern.

Other Options. Several ideas offered during the preliminary scoping sessions were beyond the jurisdiction of the National Park Service. They included an increase in public transportation, the extension of transit service to the portion of northwest suburban Virginia served by the parkway, the extension of the Metrorail to Tyson's Corner and Dulles Airport, further staggering of work hours and closing times, and restricting or improving various roads and highways under the jurisdiction of other governmental agencies.

MITIGATING MEASURES COMMON TO ALL ALTERNATIVES

Regardless of which alternative is implemented, the following measures will be undertaken to maintain the parkway as a valuable greenbelt and scenic gateway to Washington, D.C. These actions will be needed especially to mitigate the adverse effects of alternatives B, C, and D.

Parkway Standards. Specific parkway standards to supplement the existing NPS road design standards will be developed prior to construction to ensure that road work is custom-tailored to retain the parkways' historic distinguishing characteristics and aesthetic appeal. The standards will include appropriate techniques and materials for barriers, retaining walls, signs, roadway surfaces, curbing, and drainage structures.

Comprehensive Planting and Grading Plan. A comprehensive grading and planting plan will also be completed prior to construction. The grading plan will specify the action needed to reestablish the natural scene and original contours to the maximum extent possible and to ensure proper drainage of all parkway features. The planting plan will specify how the removal of mature trees, shrubs, and other vegetation will be offset by replacement with plant materials of suitable type and size to screen undesired areas and views and to create a pleasing composition.

Rosslyn Circle Comprehensive Design. A comprehensive design will be prepared for Rosslyn Circle and the connecting bike trail between the circle and the new bicycle bridge being built over the parkway just inbound from Key Bridge. The comprehensive design will recognize Rosslyn Circle as a formal landscaped gateway to the nation's capital. The design will identify areas where existing pavement will be eliminated, where the circle will be revegetated, and what planting materials will be most appropriate. The design will also seek to make the circle area harmonize with the adjacent Arlington County park over I-66. The design will include proposals for a scenic overlook of Georgetown Waterfront Park and Theodore Roosevelt Island and for enhancement of the bicycle corridor between Rosslyn Circle and the new bicycle bridge over the parkway. Recognizing that not all the bicycle route is within the parkway boundary, the National Park Service will identify opportunities for coordination with the Virginia Department of Highways and Transportation. The comprehensive design will be coordinated with a development concept plan that is currently being prepared for the Little River shoreline area adjacent to Theodore Roosevelt Island. The development concept plan addresses bike trail routing to the Arlington Memorial Bridge area, pedestrian flow, bank fishing, the Theodore Roosevelt Island parking area, and parkway access.

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PARKWAY VALUES

INTRODUCTION

George Washington Memorial Parkway has been recognized worldwide as one of the finest scenic gateways to a major city. For more than 50 years the parkway has been an integral part of the park system for our nation's capital, which many believe is the most beautiful in the world. The national capital park system originated in 1924, when Congress established the National Capital Park Commission and directed it to acquire land in the District of Columbia, Maryland, and Virginia suitable for development into a national capital park, parkway, and playground system. The broad purpose of the system was "to prevent pollution of Rock Creek and the Potomac and Anacostia Rivers, [and] to reserve forests and natural scenery in and about Washington" (PL 292). In 1930 the Capper Crampton Act (46 Stat. 482) called specifically for the acquisition and establishment of George Washington Memorial Parkway. The act directed the National Capital Park and Planning Commission (now known as the National Capital Planning Commission) to construct the parkway.

The parkway idea is uniquely American. Created by the master park builders of the 19th century, parkways are publicly respected as one of the more outstanding amenities of American landscapes. A parkway is not intended to be just a road. Rather, it is conceived as a linear strip of parklands encompassing a comprehensive spectrum of environmental and visual elements and principles, similar to the ingredients used by an artist to compose a good painting. Parkway designers use terrain, space, trees, shrubs, rock outcroppings, water features, natural edges, and the roadway itself as elements of their artistic palettes and combine them in a highly skilled manner to create expansive pictorial compositions. The full benefit of the visual variety is gained as the motorist, biker, jogger, or hiker moves through the arranged sequence of the composition. The visual experience attracts people to the parkway for the sheer pleasure of seeing the views from the road.

Landscape architect pioneers Olmstead, Vaux, Cleveland, and Eliot are credited with the first use of the term parkway. The earliest parkways, patterned after Eastern Parkway in New York, more nearly resembled boulevards, being wider and more richly furnished versions of ordinary streets. In the 1880s and 1890s the term took on an added meaning as Olmstead, Cleveland, and Eliot applied it to linear parklands, greenbelts, and other major elements of the landscape used to connect parks and public facilities in major cities such as Boston. The modern parkway came into being after World War I as a result of the work of the Westchester County (New York) Park Commission. The commission, which had acquired an outstanding technical staff headed by landscape architect Gilmore D. Clark and civil engineer Jay Downer, initiated a program for linking their sizable parks with a network of parkways of considerably improved design. The Bronx River Parkway, the prototype of the system, established the standards that were followed in the design of parkways throughout the country, including GWMP. The elements that characterize a modern parkway are listed below:

> A modern parkway is more than a road. It is a linear park, dedicated to recreation, that contains a roadway for the movement of passenger (not commercial) vehicles. It is meant for comfortable driving in pleasant surroundings, not merely for getting from one place to another.
>
> Parkway design involves a deliberate attempt to make the roadway appear like a natural part of the countryside and to eliminate the perception of parkway boundaries. The road is aligned along gentle curves, and the lanes may be widely divided on either side of interesting topographic features. Thus, the parkway strip varies in width depending upon topographic and cultural conditions.
>
> An abundant use is made of native plant materials. Significant trees and masses of native vegetation are preserved, and care is taken to minimize disfiguring scars on hillsides.
>
> Overlooks are provided at scenic points to allow the leisurely viewing of panoramas or special features.
>
> Views from the parkway are protected from undesirable features by appropriate buffers.
>
> Access is available only at limited points to minimize the disruptive effect of merging traffic. Traffic flow through intersections is facilitated by grade separations. Driving is made considerably safer and more comfortable by eliminating as many traffic distractions as possible.

GWMP is part of the legacy left by Olmstead, Eliot, Downer, and Clark. Eliot and Olmstead identified the Potomac River and its tributaries as large natural areas that should be conserved as public parklands, and Eliot played a key role in drafting the Capper-Crampton Act of 1930, the legislation that established George Washington Memorial Parkway. Downer and Clark served as consultants to the Bureau of Public Roads during the development of Mount Vernon Memorial Highway, which was the first segment of GWMP to be constructed. That segment, which was completed in 1932 to commemorate the bicentennial of George Washington's birth, was credited with following the shore of the Potomac without consuming it, and it is considered one of the East's most attractively sited roadways.

VISUAL QUALITY

As an excellent example of the nation's parkway system, GWMP provides its travelers with a route through scenic, natural, historic, and recreational settings. Extending from Mount Vernon on the south to I-495 on the north, the parkway links presidential memorials, historic sites, recreation areas that served 9 million people in 1984, and outstanding natural features. It protects the natural edges of the Potomac River and some of its watershed, and it serves as a greenbelt along the Potomac River valley. Azaleas and dogwoods bloom profusely in the spring, and in autumn the red maples, oaks, sumacs, and hickories set the hillsides ablaze with color. White-tailed deer, raccoon, wild turkey, opossum, and red fox may be seen, and birds abound in the woodlands and wetlands. Occasional openings afford views over the historic and pastoral C&O Canal into Georgetown and panoramas of Washington's monumental core. Downstream from Theodore Roosevelt Island, the river widens considerably, and distant views spread across the Potomac estuary. In addition to the scenery enjoyed from the ground, the parkway also provides a spectacular vista to visitors approaching Washington from the air.

Through the study area, the parkway's scenic attributes change as it drops off the Piedmont into the tidewater area at Spout Run. The vegetative border along the road's edge becomes noticeably narrower, and the built environments of Georgetown and Rosslyn add starkly contrasting visual elements to this segment of the parkway. A thin vegetative screen visually buffers Rosslyn from the parkway at eye level, but Rosslyn's highrise buildings are visible above the tree line. Also through this section, the median between the inbound and outbound lanes narrows from about 100 feet to less than 3 feet at the I-66 ramps, so oncoming traffic is much more visible. In spite of the urban encroachment on the parkway in this area, it retains the vegetative buffer that is essential to its parkway character and that also protects the views from Theodore Roosevelt Island.

MAJOR NATURAL FEATURES

The study section of the parkway protects scenic geologic features and a semblance of natural forest cover isolated between residential and commercial development and the Potomac River. The Great Falls and the Potomac River gorge are significant geologic features marking the transition from the Potomac Palisades of the Piedmont province to the tidewater regions of the Coastal Plain. Above Great Falls, the Potomac valley is wide, with steeply sloping sides, and the river is broad, shallow, and placid. At Great Falls, the character of the river changes. From there to Theodore Roosevelt Island, the river descends some 90 feet, flowing first through a series of narrow channels between steep rock cliffs and bedrock islands, then over a stretch of rapids and low falls. The river meets the tide and becomes an estuary at Little Falls, still 125 miles from its mouth. Crossing the Coastal Plain, the river widens, and it is flanked by wide, low terraces and in several places by bluffs carved into the soft rocks. The fall line (actually a zone) separating the Piedmont on the northwest from the Coastal Plain on the southeast passes through the study section of the parkway.

At Key Bridge, the 50-year floodplain is 15.0 feet above mean sea level and the 100-year floodplain is 17.7 feet above mean sea level. The average rate of flow in this area is 11,052 cubic feet per second. At the

Roosevelt Bridge, the 50-year flood would have a volume of 381,000 cfs, and the 100-year flood, 457,000 cfs. Some segments of GWMP within the study area are within the 100-year floodplain of the Potomac River, and most of Spout Run Parkway, both the north and south lanes, is in the 100-year floodplain of Spout Run. Flooding has affected the 100-year floodplain within the project area at times during the 1930s and 1940s. Hurricane Agnes in 1973 resulted in a 50-year storm condition. However, other than spring high-water conditions, no flooding has occurred in the last 10 years. Spout Run is a flash flood hazard area, and the last major incident occurred in the mid 1970s.

The Potomac River has good water quality except in areas of localized pollution, and it is generally suitable for water supply, recreation, and fishing.

Forests on the higher, well-drained portions of the study area include oaks and hickories interspersed with beech, red maple, bitternut hickory, yellow poplar, black walnut, and blackgum. The understory in these areas consists of dogwoods, holly, laurel, several herbaceous species, and extensive amounts of poison ivy. Sycamore and ash are the common canopy trees in the floodplain. The understory there includes eastern cottonwood, black willow, alder, black birch, blue beech, American elm, box elder, silver maple, and a diversity of herbaceous plants. Communities unique to northern Virginia form on rocky slopes and bedrock terraces. These communities are dominated by oaks that seldom grow very large. Other trees and shrubs include scrub pine, redcedar, slippery elm, pignut hickory, hackberry, and several species of herbaceous plants. The parkway is not known to have any plants currently listed as endangered or threatened by the U.S. Fish and Wildlife Service.

At least 35 species of small mammals are found in the parkway. Gray squirrels are commonly seen; red and gray foxes are occasionally seen; beaver are notably reestablishing small populations along the Potomac River; and raccoons and opossums are common nocturnal species. The varied habitats of the parkway provide cover, food, and water for more than 175 species of birds. These include several species of birds of prey that roost and/or nest along the river cliffs or utilize wooded locations during migration. The woodlands also provide habitat for a wide variety of tree-nesting songbirds. Numerous species of waterfowl, gulls, and other shorebirds concentrate along the river, especially during migration periods. The current status of reptiles and amphibians is not fully determined, but several reptile and amphibian species seem to be withstanding the pressures of increasing urbanization. The Potomac River contains such fish as catfish, carp, sunfish, perch, and bass.

No known endangered or threatened wildlife reside in the parkway, but bald eagles (Haliaeetus leucocephalus) have been infrequently observed along the Potomac River. Peregrine falcons (Falco peregrinus) are known to inhabit the region, but they have not been observed in the parkway.

CLIMATE

The area has a humid continental climate, with warm and humid summers and mild winters. Pleasant weather prevails in spring and autumn. The warmest weather normally occurs in mid July, when average daily high temperatures are in the upper 80s. The coldest weather normally occurs in late January and early February, when average low temperatures are in the upper 20s and average high temperatures are in the middle 40s. The normal annual precipitation is about 41 inches, usually well distributed throughout the year. The average annual snowfall is about 20 inches.

AIR QUALITY

The metropolitan Washington region is classified by the U.S. Environmental Protection Agency as a "nonattainment area" for carbon monoxide and ozone. This means that the region has not met the national ambient air quality standards for these pollutants as established by EPA under the provisions of the Clean Air Act. The Metropolitan Washington Council of Governments (COG) has prepared a plan outlining how the region plans to meet the national standards by the year 1987. The control strategies for mobile sources include the federal motor vehicle control program, which is expected to reduce emissions of pollutants directly from the vehicle, augmented by the inspection and maintenance program in effect in the Washington metropolitan area.

Pollutant-derived ozone is a photochemical oxidant formed from the reaction of two pollutants--hydrocarbons and nitrogen oxide--in the presence of sunlight. Of these two precursors to ozone, hydrocarbons and their effects are more easily measured. Also, controls on hydrocarbon emissions are more readily available and are generally considered more effective in reducing ozone. Hydrocarbons are evaluated on a "mesoscale," or in terms of additional loading for the region as a whole.

Carbon monoxide has different dispersion characteristics and is a more localized problem. In the metropolitan Washington region, mobile sources account for about 94 percent of the total carbon monoxide emissions. The most severe concentrations are found in the vicinity of heavily congested signalized intersections. The carbon monoxide one-hour standard is not being violated in the Washington region, but the eight-hour standard is being violated (exceeded more than once per year) at certain monitoring stations near heavily congested signalized intersections. According to the analysis performed for the COG air quality improvement plan, only one of the hot spots in northern Virginia exceeded the standard, and this location was not near the GWMP study area.

There are no air pollution monitoring stations in the vicinity of the GWMP study area, but the existing air quality was predicted for four sites where people are likely to stay for extended periods (table 1). The predicted concentrations include background levels and represent the "worst-case" conditions for each site. The most affected site is the Theodore Roosevelt Island parking area, with a high one-hour concentration of 4.8 parts per million. However, neither the peak one-hour concentrations nor the eight-hour concentrations exceed the national ambient air quality standard for carbon monoxide, which is 35.0 ppm.

Table 1: Predicted Existing Carbon Monoxide Concentrations

	One-Hour Concentration (ppm)		Eight-Hour Concentration (ppm)
Receptors	Morning Peak Hour	Evening Peak Hour	
Lorcom Lane	3.6	3.1	2.2
Lee Highway and Adams Street	3.7	3.5	2.7
Marriott Hotel	3.1	3.4	2.4
Theodore Roosevelt Island parking lot	4.4	4.8	3.3

Source: Bellomo-McGee 1984.

Note: The carbon monoxide standard for one hour is 35.0 ppm, and for the eight-hour averaging period it is 9.0 ppm.

NOISE

Traffic-generated noise and noise from other sources affect overall environmental quality. The Federal Highway Administration has published design noise levels, which represent allowable levels of traffic noise on lands adjacent to highways, for various land use categories (table 2). The study area falls into category B (parks, residences, motels, etc.), for which the design noise level is an hourly "equivalent steady state" of 67 decibels.

Existing traffic-generated noise levels were predicted for the study area using the FHWA traffic noise prediction model (table 3). Predictions were made for four sites where people are likely to stay for extended periods. According to the predictions, traffic-generated noise levels are within the acceptable limits at all four sites. The highest noise level (64.0) occurs at the parking lot for Theodore Roosevelt Island. This reflects the proximity of the site to GWMP and the relatively high traffic speeds in this area. The noise level is almost as high in the residential area near the intersection of Lee Highway and Adams Street. Noise is less at the

Table 2: FHWA Design Noise Levels

Category		Design Noise Level (dBA $L_{eq}(h)$)
A:	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose	57 (Exterior)
B:	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals	67 (Exterior)
C:	Developed lands, properties, or activities not included in categories A or B, above	72 (Exterior)
D:	Undeveloped lands	--
E:	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums	52 (Interior)

Table 3: Predicted Existing Traffic-Generated Noise Levels

Receptor	Morning Peak Hour (dBA $L_{eq}(h)$)	Evening Peak Hour (dBA $L_{eq}(h)$)
Lorcom Lane	51.7	53.4
Lee Highway and Adams Street	63.3	63.6
Marriott Hotel	54.6	53.6
Theodore Roosevelt Island parking	64.0	62.8

Source: Bellomo-McGee 1984.

Marriott Hotel because of the distance it sits back from the roadway, and less in the residential area along Lorcom Lane because traffic volumes are lower and because the houses are set back from the street. Throughout the study area the effects of traffic-generated noise on area residents are reduced by the vegetative buffer along the parkway. The noise from jet aircraft following the Potomac River flight path to and from National Airport overshadows traffic-generated noise in the vicinity of GWMP.

CULTURAL RESOURCES

A large number of sites revealing evidence of Indian occupation from the Archaic and Woodland periods (circa 8000 B.C. to A.D. 1600) have been discovered throughout the region surrounding Washington, D.C. No significant sites have been identified along the study area portion of GWMP or Spout Run Parkway. However, because of the density of prehistoric and historic Indian sites in the region, it is probable that remnants of occupation will be found along the parkway. Algonquian Indian villages were situated along the Potomac River at the time of the first recorded European contact by Captain John Smith in 1608. The Tauxenent Indians occupied the areas now known as Alexandria and Arlington and Fairfax counties until 1664. One of their small fishing villages, containing several longhouses, was located on the Virginia shore in the vicinity of Theodore Roosevelt Island. By the beginning of the 1700s, the local Indians had been forced out of the area by hostile tribes from the north and encroaching settlement by Europeans from the east and south. The location of the Tauxenent village has not been discovered, but it is generally anticipated to be across from Theodore Roosevelt Island in Virginia, and the features of the village may remain intact. Other sites might also exist. To protect potential sites, any actions that will result in ground disturbance along the parkway corridor will require archeological survey and testing.

Several historic sites are located in and immediately adjacent to the parkway. The historically and architecturally significant Francis Scott Key Bridge, completed in 1923, crosses the parkway from Rosslyn to Georgetown. The Key Bridge replaced the Potomac Aqueduct Bridge, which was built in 1833-43 as a connector for the C&O Canal linking Georgetown to Alexandria. The abutments of the Aqueduct Bridge still remain on both sides of the river, and on the Virginia side they are possibly part of the subbase of the parkway roadway. The Key Bridge and the Aqueduct Bridge abutments and piers are designated historic landmarks of Washington, D.C.

Remnants of the entrenchments at Fort Strong, one of the Civil War forts surrounding Washington, D.C., still exist along Spout Run on the hillside above the roadway close to I-66. Also adjacent to the parkway is Theodore Roosevelt Island National Memorial, which is listed on the National Register of Historic Places. A variety of remnants of earlier occupation of the area, such as a quarry site, railroad bridge abutments, trails, and mill foundations, can be found along GWMP and Spout Run.

Important cultural values of the parkway also include its landscape design. The older portion of the parkway, from Memorial Bridge to Mount Vernon, has been placed on the National Register of Historic Places for its historic values. Although more recently constructed, the segment of the parkway in the study area continues the characteristics of the southern section. Design qualities include alignment of the roadway along gentle curves with widely divided lanes, use of native plant materials, and incorporation of natural features in the design of the parkway. An expanded description of the landscape qualities of the parkway is provided earlier in this section of the document.

RECREATION RESOURCES

Scenic Roadway

The outstanding beauty of the parkway makes it a popular route for pleasure driving by both Washington area residents and out-of-town visitors. A drive along the parkway offers views of the Potomac River gorge and the prominent memorials and buildings of our nation's capital. The roadway is beautifully designed and landscaped with ornamental shrubs and green expanses of lawn bordered by native deciduous woodlands. The vibrant spring blossoms of azaleas, dogwoods, and redbuds and the warm fall colors of the woods make spring and autumn particularly popular seasons for pleasure drives along the parkway. Many parkway users are through-travelers who prefer the parkway route because it is the most scenic and relaxing of all the road corridors leading into Washington from northern Virginia.

Cultural and Recreational Sites

The parkway serves as the major link for a variety of scenic, recreational, memorial, and historic features in Virginia, Maryland, and Washington, D.C. The major sites in Virginia and their annual visitation are noted in table 4. The recreational activities associated with these sites include picnicking, fishing, jogging, hiking, bicycling, boating, river viewing, field sports, and nature study. In addition, the National Park Service and other groups offer organized tours and interpretive programs at selected sites.

Table 4: Recreation Sites Served by the Parkway

Site	1984 Visitation
Theodore Roosevelt Island	52,000
United States Marine Corps War Memorial (Iwo Jima) and Netherlands Carillon	2,500,000
Arlington House	636,000
Lyndon B. Johnson Memorial Grove and Columbia Island marina	1,000,000
Roaches Run Waterfowl Sanctuary and Gravelly Point	1,300,000
Daingerfield Island and Washington sailing marina	524,000*
Belle Haven	704,000
Fort Hunt	573,000
Riverside picnic area	472,000
Mount Vernon estate	1,100,000

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*Visitation decreased 22 percent from 1983 because of construction activities.

Theodore Roosevelt Island is the major focus of recreational activity within the study area. The 88-acre island was added to the national park system in 1932 and serves both as a presidential memorial and as a natural park for the "recreation and enjoyment of the public." Three interpretive trails meander through the island's upland, marsh, and swamp ecosystems. The memorial occupies 3 acres near the northern end of the island and includes a 23-foot-high statue of Theodore Roosevelt, backed by a 30-foot granite panel. Here the life, philosophies, and contributions of President Theodore Roosevelt are interpreted for the public.

The island receives about 50,000 visits a year from both out-of-town tourists and Washington area residents. Most of the visits occur on weekends; on weekdays, much of the visitation is from school groups. The National Park Service offers interpretive programs about the island's natural and archeological history. In addition to attending park programs, visitors enjoy exploring the island, hiking and jogging its trails, observing nature, and fishing. Most fishing and picnicking, though, occur along the Virginia shoreline, near the parking area, where the availability of picnic tables, grassy areas, and river vistas provides a better setting for these activities, and where the proximity of the parking lot reduces the distance visitors must carry food or equipment. All visitor facilities, including visitor information, restrooms, and drinking fountains, are on the island and are inconvenient to those who stay along the mainland shore. Annual visitation to the shoreline park area is estimated to be 100,000 visits annually (50,000 who pass through on their way to the island and 50,000 who stay on the shoreline to fish and picnic). The parking capacity is often reached on pleasant weekend days, particularly in the spring and fall, and parking overflows onto the grassy area next to the paved lot.

Visitation to the Theodore Roosevelt Island area is expected to increase by 100 to 200 percent once the new bicycle/pedestrian bridge and Mount Vernon Trail connection are completed (see below). A corresponding increase in demand for picnicking sites and restrooms is anticipated, and demand for parking will also likely increase because the area will become a trailhead for the Mount Vernon Trail.

Trails

The Mount Vernon Trail is a popular scenic and recreational trail that meanders along the Potomac shoreline parallel to the parkway. The 17-mile trail stretches from Mount Vernon to Arlington Memorial Bridge, connecting the parkway sites between those points. Over a half million people are estimated to use the trail every year. Most of the use occurs on weekends, when Washington area residents come out to enjoy a day's bicycle excursion and possibly to stop at one or more sites along the parkway. Hiking, jogging, and fishing are other popular weekend activities along the trail. During the week, the trail is used by bicycling commuters and lunchtime joggers. The trail is accessible from several parking areas along the parkway and from urban centers such as Alexandria and downtown Washington, D.C. Also, the trail ties into the Rock Creek and Potomac bicycle route, which begins at Memorial Bridge and goes 20 miles north along the creek corridor to Lake Needwood, Maryland. Bicyclists can access the beginning of the C&O Canal towpath from this route.

The National Park Service plans to extend the Mount Vernon Trail north from Memorial Bridge to the Theodore Roosevelt Island parking lot by 1986. The trail will tie into the planned Arlington County pedestrian/bicycle bridge at the north end of the parking area (scheduled for 1985), thus connecting the Potomac waterfront with the Rosslyn community, the county bicycle trail system, and the I-66 bicycle trail. This connection will open a continuous bicycle route between Mount Vernon and the Shenandoah Valley by way of the I-66 trail to the W&OD Railroad bicycle trail, which passes through Arlington, Fairfax, and Loudoun counties and terminates in Purcellville, Virginia, just 9 miles from the Appalachian Trail. The planned pedestrian/bicycle bridge will provide the only access across the parkway for Arlington County residents and Rosslyn workers who want to visit the Potomac waterfront. In addition, pedestrians and cyclists from the Georgetown community and the C&O Canal will have access to the new pedestrian/bicycle bridge by means of Key Bridge.

The Potomac River Trail, an unpaved hiking trail maintained by the Potomac Appalachian Trail Club, follows the parkway right-of-way for 10.2 miles from the Theodore Roosevelt Island north parking lot to its terminus at the Capital Beltway. The trail is accessible from the local Potomac tributary parks and Chain Bridge. Unlike the Mount Vernon Trail, the Potomac River Trail goes through very rugged, wooded natural areas and provides excellent opportunities for viewing birds, wildflowers, waterfalls, cliffs, and riverscapes. Within the study area, where the strip of land between the river and parkway is narrow, the trail sometimes comes very close to the parkway. In one section, hikers must actually walk alongside the roadway and follow trail blazes placed on the road signs. The National Park Service is studying the feasibility of making this trail, as well as the Mount Vernon Trail, part of the 700-mile Potomac Heritage National Scenic Trail.

Adjacent Recreation Resources

GWMP forms the major green space along the eastern edge of Arlington County. Four county parks and one regional park border GWMP north of Spout Run Parkway. These are Gulf Branch, Taylor, Donaldson Run, Windy Run, and Potomac Overlook parks. Combined these parks have 157 acres, two nature centers, and 9 miles of trails used for hiking, jogging, birding, and nature study. The three tributary parks have trails that link with the Potomac River Trail.

Downtown Rosslyn currently has three small "vest pocket" parks that are heavily used by workers during their lunch hours. Each small park may contain 150 to 200 people at any one time between 11 a.m. and 3 p.m. The county plans to develop one more small park in the Rosslyn area. Also, the state is planning to build a 2-acre park over I-66 that is expected to relieve much of the pressure on these other parks. The I-66 park is slated to be completed by late 1986, at which time the state will give it to the county to manage. The park will be much larger than the other parks and will include food concessions, an amphitheater, and water features. Once the pedestrian/bicycle bridge is completed, a walk to the Potomac waterfront from Rosslyn parks and offices will be less than a quarter mile long.

TRAFFIC ANALYSIS

REGIONAL OVERVIEW

GWMP and Spout Run Parkway are part of a regional highway system that can be characterized as a network of radial routes focused on Washington, D.C. The greater Washington metropolitan area is encircled by the Capital Beltway, which links these radial routes and provides a circumferential bypass route for through-traffic. The Capital Beltway is part of the interstate system (I-95/I-495), and it crosses both the north and south ends of GWMP.

The primary constraint on the highway system in the vicinity of GWMP is the Potomac River. Seven automobile bridges cross the river in this area (see the Region map):

> Cabin John Bridge (American Legion Bridge) on the Capital Beltway (I-495), currently three lanes in each direction, but widening to four lanes is underway
>
> Chain Bridge, two lanes outbound and one lane inbound except during the morning rush hours, when the center lane reverses
>
> Francis Scott Key Memorial Bridge (US 29), three lanes in each direction
>
> Theodore Roosevelt Memorial Bridge (I-66 and US 50), three lanes in each direction
>
> Arlington Memorial Bridge, three lanes in each direction
>
> George Mason Memorial Bridge, Arland D. Williams Memorial Bridge, and Rochambeau Memorial Bridge (14th Street Bridge), two bridges consisting of four lanes each to serve traffic in each direction and an additional bridge of four lanes reserved for HOV-4 vehicles

These bridges all carry heavy traffic loads during rush hours, and an incident or delay on one has an adverse effect on the other bridges and on GWMP and the other connecting roads. Another critical factor affecting traffic flow is the capacity of the road network in the District of Columbia to absorb the inbound traffic as it crosses the bridges.

The study area of the Spout Run and GWMP roadways is roughly paralleled by a section of I-66 that was completed in 1982. On this portion of I-66, rush-hour traffic on the inbound lanes during the morning and on the outbound lanes during the evening is restricted to HOV-3 vehicles. Trucks are prohibited from using this section of I-66 at all times. When this highway opened there was an HOV-4 restriction in effect between 6:30 and 9:00 a.m. and 3:30 and 6:30 p.m., but the U.S. Congress subsequently passed legislation to authorize a reduction in the occupancy requirement to HOV-3 and a reduction in the restricted use hours to 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.

Several other major arterials affect traffic in the vicinity of GWMP. US 50 (Arlington Boulevard) and US 29 (Lee Highway) are heavily used routes serving the Potomac River crossings. State routes VA 27 (Washington Boulevard) and VA 110 (Jefferson Davis Highway) provide east-west linkages to the Pentagon and I-395.

The Washington region is served by extensive Metrobus and Metrorail systems, both operated by the Washington Metropolitan Area Transit Authority. The Metrobus system serves all jurisdictions. Most of the commuter routes in the vicinity of GWMP originate in the northern Virginia suburbs and terminate at the Rosslyn Metrorail station, but some cross Key Bridge and terminate in downtown Washington at Farragut Square. One peak-period bus route from western Fairfax County uses GWMP.

The Metrorail system, which began operation in 1976, has attracted a steadily increasing ridership. As of December 31, 1984, 60.5 miles of the system were in operation, and another 13.4 miles were under construction. Both the "blue" and "orange" lines serve the Rosslyn station. The blue line outbound currently terminates at Huntington. The orange line outbound currently terminates at Ballston in Arlington, but it will be completed to Vienna in Fairfax County in December 1986. Both lines connect with all other lines in downtown Washington. An estimated 12,000 passengers boarded the system each weekday at the Rosslyn station in August 1984.

The Metropolitan Washington Council of Governments periodically conducts counts of persons and vehicles crossing the Capital Beltway and of those crossing into the central business district. These counts are undertaken to monitor trends in transportation pertaining to private vehicle use, vehicle occupancies, transit use, and truck traffic, and the trends help determine transportation policy and system requirements. Based on the beltway count conducted in the fall of 1981 during the morning peak period (6:30 to 9:30 a.m.), 8 percent of the inbound travelers entered the larger metropolitan area in a transit vehicle and the remaining 92 percent drove or rode in automobiles. By 1984 transit ridership had fallen to 6 percent. Transit was more widely used closer to the central business district than it was in the outlying suburbs; however, the near-city ridership also decreased between 1981 and 1984. In 1981, 34 percent of the inbound travelers entered the central business district in a transit vehicle and 66 percent drove or rode in automobiles. In 1983, 31 percent entered the central business district by transit and 69 percent by automobile. In both 1981 and 1984 approximately 13 percent of those entering the central business district traveled on the Metrorail system.

TRAFFIC ORIGINS AND EMPLOYMENT GROWTH

Morning rush-hour traffic on GWMP originates primarily in Fairfax and Arlington counties, Virginia, and Montgomery County, Maryland. One morning rush hour count (Bellomo-McGee 1984) indicated that 55 percent of the traffic was from the outlying suburbs in Virginia (I-495 and VA 123), 24 percent was from the inlying Virginia suburbs (inside the Capital Beltway), and 21 percent was from Maryland. The main destination of this commuter traffic is Washington, D.C. While downtown Washington remains the core employment center within the metro area, the suburban counties of Arlington, Fairfax, and Montgomery are becoming major employment centers. The bulk of this employment growth is in the private sector in the areas of communications, services, and high-tech industry (table 5). Such growth is expected to be the trend into the next century. With growing job opportunities in the outlying areas of Fairfax and Montgomery counties, reverse commuting from Washington and the inner suburbs is expected to increase. In addition, more business travel between suburban and downtown offices can be expected since much work within the private sector is linked to federal government contracts.

Table 5: Projected Changes in Population, Households, and Employment from 1980 to 2000 (percent change)

	Arlington County		Fairfax County	Montgomery County	Washington, D.C.
Population	+3	(+12)*	+24	+21	-1
Households	+13	(+24)	+45	+39	+5
Total employment	+35	(+32)	+64	+36	+9
Retail	+18	(+12)	+38	+34	+14
Office	+63	(+45)	+107	+35	+9
Industrial	0	(+2)	+31	+46	+10
Other	-6	(-38)	+16	+31	+11

Source: Metropolitan Washington Council of Governments, Round III Intermediate Forecasts for 1980 and 2000.

*Numbers in parentheses denote the projected changes for the Rosslyn/Spout Run area. These percentages were derived primarily from COG forecasts and Arlington County development plans.

Growth in Fairfax County will occur in and around Tysons Corner, Reston, Fair Oaks, and the US 50/I-66 intersection. As these employment centers develop, the county's major population growth is expected to occur in western Fairfax County, specifically Herndon, Reston, Chantilly, Centreville, and West Springfield. These locations are within reasonable commuting distance of the new suburban job centers, have a supply of vacant land, and are comparatively less expensive. No substantial increase in population is projected for those Fairfax County areas closer to Washington, such as Falls Church, McLean, or Vienna. The only exception is the area bordering Alexandria near the Metrorail system.

In Montgomery County the growth in employment will continue primarily along the I-270 and US 29 corridors. This growth will be spurred by the increasing attractiveness of the Washington/Baltimore area as an investment market. Also, the county has developed a good base of high-tech industries and is expecting to attract even more. As this growth occurs, more and more commuting will occur from Maryland counties outside the metro area. The most significant population growth in the county is expected in the outlying areas of the I-270 and US 29 corridors, where plenty of vacant land is available. Population in inner areas such as Silver Spring, Wheaton, and Bethesda is expected to decline or rise only slightly.

The proximity of Arlington to downtown Washington, National Airport, and the Metrorail system is making the county an increasingly popular location for businesses, especially offices and hotels. Available office space (both old and new) is rapidly being leased, and the vacancy rate currently is only 2 percent. The demand for office space is spurring a high level of new construction and redevelopment in the Metrorail corridors. The long-range impact of this construction growth will be a dramatic increase in office employment levels, with an echoing increase in retail activities and household numbers.

ROADWAY AND OPERATING CHARACTERISTICS

The northern portion of the GWMP study area is situated along a narrow escarpment that slopes steeply toward the river. The inbound and outbound roadways are separated by a vertical distance of about 93.5 feet at the steepest point north of Key Bridge. The inbound roadbed grade is about 7 percent through this steepest section. It gradually flattens to a level grade in the vicinity of Key Bridge. The two roadways remain separated, however, by a slope of approximately 11.5 feet. The road generally follows the contours of the Potomac River within the study area. There are slight S-curves in both the inbound and the outbound roadways north of Key Bridge and a sharper curve between Key Bridge and Theodore Roosevelt Island.

The Spout Run Parkway follows the gentle curves of the Spout Run streambed, descending about 100 feet to its intersection with GWMP. The inbound and outbound roadways, which lie on either side of the streambed, are separated by a vertical distance of about 40 feet at one steep point.

Both parkways have two 12-foot lanes in each direction. In areas where the inbound and outbound lanes are not separated by steep grades, they are separated by median dividers. On GWMP the medians range in width from 6 feet to about 240 feet. There are no paved shoulders on either parkway. Disabled vehicles can drive over the 3-inch-high mountable curbs to grassy areas on either side of the roadway.

A major exception to the two-lane configuration occurs near the intersection of inbound GWMP and Spout Run. Beginning about 800 feet from the intersection on GWMP and 730 feet on Spout Run, traffic on each roadway is funneled by roadway striping into a single lane that continues through the merge area to re-form GWMP's two-lane roadway. Traffic at this intersection is managed differently during the morning rush hours, as described below.

Both parkways are limited-access roadways. Within the study area GWMP can be accessed only from Spout Run Parkway (inbound only), Key Bridge (outbound only), and Roosevelt Bridge (outbound only). Exits off GWMP are similarly limited and exist only at Spout Run (outbound only), Key Bridge (inbound only), and Roosevelt Bridge (inbound only).

The only entrance and exit for the parking lot for Theodore Roosevelt Island is from the outbound lanes of GWMP. Drivers wishing to leave the parking lot and return to Washington, D.C., or points south must use the Spout Run turnaround.

Spout Run Parkway is accessible from Lee Highway via Kirkwood Road or from Lorcom Lane inbound, and from GWMP outbound. Turnarounds are provided for traffic in both directions. The outbound turnaround accommodates outbound GWMP traffic desiring to go into Washington, D.C. Since there is no exit from outbound GWMP to the Roosevelt Bridge or Key Bridge, outbound travelers must turn around on Spout Run and approach the bridges from inbound GWMP. The inbound turnaround accommodates inbound Spout Run traffic desiring to turn onto Lorcom Lane, since left turns onto Lorcom Lane are currently prohibited at all times.

The posted speed limit on GWMP and the Spout Run Parkway within the study area is 40 mph. During the rush hours the actual speeds slow to about 25 mph inbound between Spout Run and Key Bridge in the morning and to about 20 mph outbound between Key Bridge and Spout Run in the afternoon. At night and early in the morning, a high percentage of vehcles travel faster than 50 mph.

During the morning peak period (7:00 to 9:00 a.m.) traffic controls are imposed at three locations.

GWMP/Spout Run intersection: At all other times the inbound traffic on each parkway is funneled into a single lane before reaching the merge area. During the morning peak period, however, two lanes of traffic are permitted on both roadways. (Signs advising of this condition are manually operated by U.S. Park Police personnel.) A U.S. Park Police officer directs traffic through the intersection, allowing two lanes of traffic to proceed from one parkway while stopping the two lanes of traffic on the other. About 6 minutes is allowed for GWMP traffic, then 2 minutes for Spout Run Parkway traffic. Queues form on both parkways, often as far as 2 miles on GWMP prior to the Spout Run Parkway entrance.

Off-ramp to Key Bridge: A physical barrier is placed across the GWMP off-ramp to Key Bridge from 7:00 a.m. to 9:00 a.m. Frequently a queue develops prior to 9:00 a.m. from vehicles in the deceleration lane waiting for the barricades to be removed, despite the "No Waiting" signs.

Spout Run/Lorcom Lane intersection: Traffic is controlled to allow uninterrupted left turns from Lorcom Lane to inbound Spout Run during the morning rush hours. U.S. Park Police place barricades on outbound Spout Run Parkway east of the intersection to divert outbound through-traffic to Lorcom Lane and keep it from interfering with left turns onto inbound Spout Run.

TRAFFIC VOLUMES

Three measures have been used to evaluate vehicle travel patterns and trends in the study area: weekday average daily traffic (ADT), weekday morning peak-hour volume, and weekday evening peak-hour volume.

As of this report date, no continuous traffic counting programs have been implemented for either parkway. However, volume data have been collected periodically on selected segments in the study area by various agencies, including the Eastern Direct Federal Division of the Federal Highway Administration (at the request of the National Park Service), the Virginia Department of Highways and Transportation, the Arlington County Department of Public Works, and the District of Columbia Department of Public Works.

The available traffic volume data include 24-hour, 48-hour, and 72-hour counts, and 9-day to 15-day counts collected periodically between June 1982 and August 1984. The data obtained by FHWA formed the basis for the derived weekday ADT and the morning peak-hour volumes. FHWA collected multiple-day traffic counts using automatic data collection equipment during September and October 1982, January and February 1983, February and March 1984, and June and July 1984.

The weekday ADT for sections of GWMP and Spout Run are shown on table 6. This table shows the most recent traffic counts (June and July 1984) and historical counts to illustrate the changes in traffic volumes over time. As shown on table 6, the weekday ADT increased between 1972 and September 1982. After the opening of I-66 inside the beltway in

Table 6: Current and Historical Weekday Average Daily Traffic on GWMP/Spout Run Parkway

	Weekday Average Daily Traffic (vehicles per day)					
Route Segment	1972	1977	Sept. 1982	Feb. 1983*	Feb. 1984**	July 1984
Inbound						
GWMP from VA 123 to Spout Run	25,000	30,000	30,000	25,500	22,500	26,500
GWMP from Spout Run to off-ramp to Key Bridge/Rosslyn	34,000	39,000	40,000	35,000	30,000	35,000
GWMP from off-ramp to Key Bridge/Rosslyn to off-ramp to Roosevelt Bridge	26,000	28,000	29,000	27,500	23,500	27,500
GWMP from off-ramp to Roosevelt Bridge to on-ramp from US 50	17,000	18,000	16,500	18,000	18,000	20,000
Off-ramp to Key Bridge/Rosslyn	8,000	11,000	11,000	7,500	6,500	7,500
Off-ramp to Roosevelt Bridge	9,000	10,000	12,500	9,500	5,500	7,500
Spout Run Parkway	9,000	9,000	10,000	9,500	7,500	8,500
Outbound						
GWMP from on-ramp from Memorial Circle to on-ramp from Roosevelt Bridge	20,000	21,000	22,000	19,000	18,500	20,000
GWMP from on-ramp from Roosevelt Bridge to on-ramp from Key Bridge/Rosslyn	26,000	27,000	32,000	26,000	26,000	28,000
GWMP from on-ramp from Key Bridge/Rosslyn to Spout Run	36,000	37,000	49,000	38,000	37,000	42,000
GWMP from Spout Run to VA 123	25,000	27,500	37,500	28,500	27,500	30,500
On-ramp from Roosevelt Bridge	6,000	6,000	10,000	7,000	7,500	8,000
On-ramp from Key Bridge/Rosslyn	13,000	10,000	17,000	12,000	11,000	14,000
Spout Run Parkway	11,000	9,500	11,500	9,500	9,500	11,500

Source: Derived from data collected by FHWA and rounded to the nearest 500 vehicles per day.

*I-66 opened at HOV-4.
**I-66 changed to HOV-3.

December 1982, the traffic patterns changed. A comparison of the data for September 1982 and February 1983 shows that significant reductions in traffic occurred throughout the GWMP study area, and most notably on the on-ramps from Key and Roosevelt bridges, the critical outbound section of GWMP between Key Bridge and Spout Run, and the off-ramps to both Key and Roosevelt bridges. Traffic flows normally fluctuate seasonally, so there may be differences between September/October traffic counts and January/February traffic counts attributable to factors other than the opening of I-66, such as recreational travel or weather. However, it was concluded that the changes in traffic patterns represented by the data are mostly attributable to the opening of I-66. Another change in traffic patterns occurred in January 1984 when the HOV restrictions on I-66 were changed from HOV-4 to HOV-3. This did not significantly change the ADT volumes on outbound GWMP, but it resulted in further reductions in ADT on inbound GWMP. The most recent traffic counts, collected in June and July of 1984, reflect subsequent increases in weekday ADT throughout the GWMP study area. In fact, traffic in the summer of 1984 was once again as high or higher than the comparable traffic in the winter of 1983.

GWMP carries heavy traffic during the peak hours (see table 7). In the most critical segment the evening peak-hour volumes on outbound GWMP between the on-ramp from Key Bridge/Rosslyn and the Spout Run Parkway regularly exceed the theoretical capacity of the roadway. Theoretical capacity, as defined in the Highway Capacity Manual (National Academy of Sciences 1965), is 2,000 vehicles per hour per lane under ideal uninterrupted conditions.

The opening of I-66 had little effect on morning peak-hour traffic. However, a decrease in evening peak-hour traffic occurred on outbound GWMP between Memorial Circle and Key Bridge after the opening of I-66. After the reduction in the high-occupancy-vehicle requirements on I-66 from HOV-4 to HOV-3 in January 1984, the morning peak-hour traffic also decreased significantly. Recent traffic counts collected in June and July of 1984 show only slight recent changes in the morning and evening peak-hour volumes.

A critical section of the GWMP study area is the merge and weaving section on the outbound roadway between Key Bridge and Spout Run. As many as 4,500 vehicles travel this section in the evening peak hour. This is 500 vehicles more than the theoretical capacity of this two-lane roadway. The vehicles entering this section of GWMP from the on-ramp from Key Bridge/Rosslyn must merge into the left lane of GWMP. Traffic congestion on GWMP is aggravated by these vehicles merging onto the main section of the roadway, and the congested conditions on GWMP cause considerable queuing on the on-ramp from Key Bridge/Rosslyn. A license plate survey was conducted to analyze the evening rush hour weaving patterns in this short (0.3-mile) section of GWMP. The survey indicated that approximately 23 percent of the vehicles entering from the on-ramp from Key Bridge/Rosslyn exit at Spout Run Parkway. This amounts to about 300 vehicles during the evening peak hour. Approximately 51 percent of the vehicles traveling in the left lane of GWMP just before the

Table 7: Current and Historical Peak-Hour Traffic Volumes on GWMP/Spout Run Parkway

Route Segment	1972	1977	Sept. 1982	Feb. 1983*	Feb. 1984**	July 1984
Inbound/Morning Peak Hour						
GWMP from VA 123 to Spout Run	2,400	2,750	3,000	3,000	2,600	2,750
GWMP from Spout Run to off-ramp to Key Bridge/Rosslyn	3,900	3,900	3,700	3,800	3,300	3,450
GWMP from off-ramp to Key Bridge/Rosslyn to off-ramp to Roosevelt Bridge	3,900	3,900	3,700	3,800	3,300	3,450
GWMP from off-ramp to Roosevelt Bridge to on-ramp from US 50	2,300	2,300	1,400	1,700	2,200	2,150
Off-ramp to Key Bridge/ Rosslyn***	0	0	0	0	0	0
Off-ramp to Roosevelt Bridge	1,600	1,600	2,050	2,100	1,100	1,300
Spout Run Parkway	1,500	1,150	700	800	700	700
Outbound/Evening Peak Hour						
GWMP from on-ramp from Memorial Circle to on-ramp from Roosevelt Bridge	2,200	2,200	2,750	2,100	2,050	1,900
GWMP from on-ramp from Roosevelt Bridge to on-ramp from Key Bridge/Rosslyn	2,900	2,900	3,850	3,250	3,200	3,000
GWMP from on-ramp from Key Bridge/Rosslyn to Spout Run	4,200	4,500	4,350	4,400	4,350	4,350
GWMP from Spout Run to VA 123	3,000	3,500	3,300	3,350	3,200	3,250
On-ramp from Roosevelt Bridge	700	700	1,150	1,200	1,150	1,100
On-ramp from Key Bridge/Rosslyn	1,300	1,600	1,400	1,300	1,350	1,600
Spout Run Parkway	1,200	1,000	1,000	1,050	1,150	1,100

Source: Derived from raw traffic count data collected by FHWA and rounded to the nearest 50 vehicles per hour.

*I-66 opened at HOV-4.
**I-66 changed to HOV-3.
***Closed to traffic from 7:00 to 9:00 a.m.

ramp from Key Bridge/Rosslyn also exit at Spout Run Parkway. This amounts to almost 800 vehicles during the evening peak hour. In all, as many as 550 vehicles change lanes in this 0.3-mile-long, two-lane section of GWMP. An average of 21 percent of the traffic on outbound GWMP before the Key Bridge ramp had Maryland license plates, compared to an average of 25 percent of the traffic beyond the Spout Run exit.

ACCIDENTS

Based on a 1984 traffic engineering and safety improvement study for all of GWMP north of Alexandria, the accident rate per million vehicle miles of travel was 1.83 from 1981 through 1983. This accident rate was between the average rate for all Virginia four-lane primary highways with fully controlled access (0.9) and the average rate for all Virginia four-lane primary highways with partially controlled access (2.3), as indicated by 1981 and 1982 accident data from the Virginia Department of Highways and Transportation. It should be noted that the National Park Service records all accidents, whereas the commonwealth of Virginia records those accidents that exceed $500 in property damage.

There were 420 reported accidents in the study area between January 1, 1981, and December 31, 1983, based on accident data obtained from the Arlington County Department of Public Works and the U.S. Park Police. Of this total, 123 accidents occurred in the Rosslyn Circle area and the remaining 297 occurred on GWMP, the on- and off-ramps, and Spout Run Parkway (see tables 8 and 9). The accidents caused three fatalities and 101 injuries between 1981 and 1983. All of the fatalities occurred at night.

Approximately 43 percent of the accidents that occurred in 1981-83 in the study area were rear-end collisions, 17 percent were side-swipe collisions between vehicles traveling in the same direction, and almost 15 percent were right-angle collisions. These percentages indicate a significant safety problem related to congestion, and this finding is reinforced by the relatively high incidence of accidents during the rush hours compared to the proportion of total traffic that occurs during these periods. Approximately 33 percent of all the reported accidents on inbound GWMP occurred during the weekday morning peak period (6:00-10:00 a.m.). This was a relatively high percentage considering that only 25 percent of the average annual vehicle miles of travel occurred during that time period. Similarly, more than 29 percent of all reported accidents on outbound GWMP occurred during the weekday evening peak period (3:00-7:00 p.m.), while only 25 percent of the average annual vehicle miles of travel occurred during those hours.

Seventy-five percent of the 420 accidents reported in the study area occurred at ten specific locations. These locations are listed in table 10.

At the signalized intersection of Fort Myer Drive and the on-ramp to outbound GWMP, 57 accidents were reported between 1981 and 1983. Almost half of these occurred between the hours of 11:30 p.m. and

Table 8: Accident Summary for GWMP/Spout Run Parkway, 1981-1983

Route Segment	Fatalities	Injuries	Accidents				Average Accident Rate (No./MVM*)
			Fatal	Personal Injury	Property Damage Only	Total	
Inbound							
Spout Run Parkway from Lorcom Lane to turnaround	--	1	--	1	3	4	6.4
Spout Run Parkway from turnaround to junction with GWMP	--	15	--	5	2	7	1.2
GWMP from north end of bridge over Spout Run to junction with Spout Run Parkway	--	3	--	3	20	23	7.5
GWMP from Spout Run Parkway to off-ramp to Key Bridge/ Rosslyn	--	9	--	8	44	52	2.0
Off-ramp from GWMP to Key Bridge/ Rosslyn	--	4	--	4	18	22	12.1
GWMP from off-ramp to Key Bridge/ Rosslyn to off-ramp to Roosevelt Bridge	--	7	--	5	13	18	1.3
Off-ramp from GWMP to Roosevelt Bridge	--	--	--	--	--	--	--
GWMP from off-ramp to Roosevelt Bridge to US 50 overpass	--	1	--	1	6	7	

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*MVM = million vehicle miles

Route Segment	Fatalities	Injuries	Accidents				Average Accident Rate (No./MVM*)
			Fatal	Personal Injury	Property Damage Only	Total	
Outbound							
GWMP from south end of Boundary Channel Bridge to on-ramp from Roosevelt Bridge	--	5	--	5	7	12	2.6
On-ramp from Roosevelt Bridge to GWMP	--	4	--	3	13	16	8.5
GWMP from on-ramp from Roosevelt Bridge to access to Roosevelt Island parking area	1	3	1	2	8	11	2.3
GWMP from access to Roosevelt Island parking area to on-ramp from Key Bridge/Rosslyn	--	2	--	2	21	23	1.2
On-ramp from Key Bridge/Rosslyn to GWMP	--	3	--	2	10	12	1.9
GWMP from on-ramp from Key Bridge/Rosslyn to Spout Run	--	2	--	2	20	22	1.5
GWMP from Spout Run exit to north end of bridge over Spout Run	--	--	--	--	11	11	5.1
Spout Run Parkway from junction with GWMP to turnaround	2	7	1	6	8	15	2.0
Spout Run Parkway from turnaround to Lorcom Lane	--	16	--	11	31	42	19.6
Totals	3	82	2	60	235	297	--

Table 9: Accident Summary for Rosslyn Circle Area, 1981-1983

			Accidents				Average
Route Segment	Fatalities	Injuries	Fatal	Personal Injury	Property Damage Only	Total	Accident Rate (No./MVM*)
Westbound Fort Myer Drive from end of Key Bridge to on-ramp to GWMP	--	8	--	5	48	53	42.7
Westbound Fort Myer Drive from on-ramp to GWMP to Lee Highway intersection	--	4	--	3	12	15	5.8
Eastbound Lynn Street from Lee Highway intersection to on-ramp to GWMP	--	6	--	6	38	44	20.6
Crossover from eastbound Lynn Street to on-ramp to GWMP	--	1	--	1	3	4	15.6
Eastbound Lynn Street from off-ramp from GWMP to Key Bridge	--	--	--	--	7	7	6.0
Totals	--	19	--	15	108	123	--

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*MVM = million vehicle miles

4:00 a.m., Alcohol was a major contributing factor to these accidents. In fact, in 50 percent of these late-night accidents, at least one of the drivers involved was cited by the investigating officer on the report as being under the influence of alcohol. The most common type of accident was a rear-end collision in which the first vehicle traveling across Key Bridge slowed or stopped for a red light and was struck in the rear by the second vehicle. More than 72 percent of the reported accidents at this location were rear-end collisions.

At the intersection of North Lynn Street and the off-ramp from inbound GWMP, 50 accidents were reported between 1981 and 1983. About 36 percent occurred during the evening peak period (3:00-7:00 p.m.) when traffic on North Lynn Street was heavy and the ramp from inbound GWMP was open. Half of all the accidents were right-angle collisions in which a vehicle leaving the off-ramp was struck by a vehicle proceeding toward Key Bridge on North Lynn Street. Another 20 percent were side-swipe collisions involving one vehicle desiring to cross North Lynn Street to make a left turn to Fort Myer Drive and another vehicle attempting to go straight on North Lynn Street.

At the intersection of Lorcom Lane and Spout Run Parkway, 37 accidents were reported between 1981 and 1983. More than three-quarters of these accidents were right-angle collisions involving one vehicle pulling out from the Lorcom Lane approach and another vehicle proceeding toward Lee Highway on Spout Run Parkway. Additional accidents of this type would have been expected if outbound Spout Run had not been closed to through-traffic west of Lorcom Lane during the morning rush hours.

At the junction of inbound GWMP and the off-ramp to Key Bridge/Rosslyn, 32 accidents were reported between 1981 and 1983. More than half of the accidents were rear-end collisions involving two vehicles on GWMP, and another 34 percent were accidents in which a vehicle ran off the right side of the road and hit a sign post, guardrail, or pole. The curve at this location is extremely sharp and sight-distance for drivers on GWMP is severely restricted by the Key Bridge abutments. Twenty-two percent of the reported accidents at this location occurred between 7:00 a.m. and 10:00 a.m. As described previously, the ramp to Key Bridge is currently closed during the morning peak period (7:00 to 9:00 a.m.). However, cars often illegally queue up at this location before 9:00 a.m., waiting for the ramp to open.

At the junction of outbound GWMP and the ramp from Roosevelt Bridge, 22 accidents were reported between 1981 and 1983. More than 59 percent of the accidents were rear-end collisions involving two or more vehicles on the ramp. Approximately 27 percent of all accidents occurred between 3:00 and 7:00 p.m. on weekdays, and another 27 percent occurred between 7:00 and 9:30 p.m. on weekdays. Sight distance to the merge area for outbound drivers on GWMP is severely restricted by the ramp structure and the vertical alignment. Sight distance is also very limited for drivers entering the parkway from the ramp; near the end of the ramp, these drivers have to look back to observe vehicles approaching on GWMP. The acceleration lane is too short for operating conditions,

Table 10: Frequent Accident Locations

Location	Average Annual Accident Frequency 1981-1983	Average Accident Rate
Inbound		
Inbound Lorcom Lane and Spout Run Parkway (including the outbound Spout Run Parkway approach to the intersection)	12	1.0/MVE
Spout Run Parkway and inbound GWMP	7	0.5/MVE
GWMP between Spout Run Parkway and off-ramp to Key Bridge/Rosslyn	13*	5.1/MVM**
Junction of GWMP and off-ramp to Key Bridge/Rosslyn	11	0.8/MVE
Off-ramp to Key Bridge/Rosslyn	3*	12.1/MVM
Key Bridge off-ramp at Lynn Street	17	1.0/MVE
Outbound		
On-ramp from Roosevelt Bridge	7	0.7/MVE
On-ramp from Key Bridge/Rosslyn at Fort Myer Drive	19	1.1/MVE***
GWMP at on-ramp from Key Bridge/Rosslyn	10	0.6/MVE
Spout Run Parkway	5*	2.0/MVM
Total	104	

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* These are nonintersection accidents. Accidents that occurred at the intersections at the ends of this roadway section are not included.
** MVM = million vehicle miles
***MVE = million vehicles entering

especially during the evening peak period, when traffic on the ramp is heavy. Field observations confirm that drivers on GWMP approaching the junction often swerve erratically into the left lane to avoid vehicles entering the traffic stream from the ramp.

At the junction of the on-ramp from Key Bridge/Rosslyn and outbound GWMP, 30 accidents were reported between 1981 and 1983. More than 53 percent of these were rear-end collisions involving two or more vehicles on outbound GWMP, 20 percent were rear-end collisions involving two or more vehicles on the ramp, and 20 percent were side-swipe collisions involving one vehicle traveling on GWMP and another vehicle entering GWMP from the ramp. More than 43 percent of all the reported accidents occurred during the weekday evening peak period (3:00 to 7:00 p.m.). Another 30 percent occurred during the weekend, when traffic volumes were lower but speeds were higher.

At the junction of inbound GWMP and inbound Spout Run Parkway, 22 accidents were reported between 1981 and 1983. All but one of the accidents were rear-end collisions involving two vehicles on GWMP. Sixty-eight percent of these accidents occurred during the weekday morning peak period (6:00 to 10:00 a.m.), and 36 percent occurred between 7:00 and 9:00 a.m. As was stated earlier, between approximately 7:00 and 9:00 a.m., a U.S. Park Police officer directs traffic at this intersection. During this time period, inbound traffic on GWMP does not have the continuous right-of-way and must sometimes stop at this junction. This stop-and-go traffic condition is conducive to rear-end collisions.

At inbound GWMP between inbound Spout Run Parkway and the off-ramp to Key Bridge/Rosslyn, 38 accidents were reported between 1981 and 1983, not including the accidents that occurred at the junctions at either end of this segment. Almost 37 percent of these accidents occurred during the weekday morning peak period (6:00 to 10:00 a.m.). Fifty-eight percent of the total reported accidents were rear-end collisions, and an additional 18 percent were accidents in which a vehicle ran off the road and hit a tree, stone wall, post, or bridge abutment.

At outbound Spout Run Parkway from the junction with outbound GWMP to the turnaround, 15 accidents were reported between 1981 and 1983. In more than half of the reported accidents, a vehicle ran off the road. One of these accidents resulted in two fatalities, and five other accidents resulted in a total of seven personal injuries. This roadway section had the highest injury rate of all the locations examined in the study area (see table 10). The alignment of this section of Spout Run Parkway is along an upgrade and is curvilinear.

At the off-ramp from inbound GWMP to Key Bridge/Rosslyn, 10 accidents were reported between 1981 and 1983, not including the accidents that occurred at the junctions at either end of this segment. The curvature of the ramp is very sharp; it has less than a 100-foot radius at the apex, an 8 percent grade on one short segment, and a 5 percent grade overall. Interestingly, 60 percent of the reported accidents occurred during the weekend. (This ramp is currently closed during the weekday morning peak period, when a large proportion of accidents would otherwise be expected to occur.)

LEVEL OF SERVICE

A key determinant of the ability of a road system to accommodate the travel demand is the level of service concept. Level of service is a qualitative assessment of vehicle mobility along a roadway or through an intersection and is represented by a rating between A and F, with A representing little or no delay and F representing extreme congestion. The six levels of service are defined as follows:

A:	Free flow conditions, no delays, and all signal phases of sufficient duration to clear all approaching vehicles
B:	Stable flow conditions, little delay, some signal phases unable to handle all approaching vehicles
C:	Stable flow conditions, low to moderate delays, full use of peak directional signal phase(s)
D:	Approaching unstable flow conditions, moderate to heavy delays, significant signal-time deficiencies for short durations during the peak period
E:	Unstable flow conditions, significant delays, significant signal-time deficiencies throughout the peak period
F:	Forced flow conditions, low travel speeds, demand volumes well above capacity (This condition is reached when vehicles released by an upstream signal are unable to proceed because of backups from a downstream signal.)

Levels of service were computed using the procedures outlined in Interim Materials on Highway Capacity. This report was released by the Transportation Research Board as an interim report to be distributed prior to the publication of a new highway capacity manual in the mid 1980s. The "critical movement analysis procedure" was employed to assess the level of service at ten locations in the study area. The results of this assessment are listed in table 11. As shown on the table, many locations have very low levels of service during the peak periods. During the morning peak hour, level of service is E or F at the following locations:

junction of Spout Run Parkway and inbound GWMP

inbound GWMP off-ramp to Roosevelt Bridge

junction of inbound I-66 and the GWMP off-ramp to Roosevelt Bridge

Table 11: Current Levels of Service

Route Segment	Morning Peak Hour (7:00-8:00)	Evening Peak Hour (5:00-6:00)
Intersection of Lorcom Lane and Spout Run Parkway		
Traffic turning left from Lorcom Lane onto Spout Run Parkway	A[1]	E
Junction of inbound GWMP and Spout Run Parkway		
All traffic entering intersection	E[2]	B
Junction of inbound GWMP and off-ramp to Key Bridge/Rosslyn		
Traffic diverging to ramp	--[3]	B
Through-traffic on GWMP	D[1]	B
Inbound off-ramp to Key Bridge/Rosslyn		
Traffic on ramp	--[3]	D[4]
Intersection of GWMP off-ramp and North Lynn Street		
Traffic turning right from ramp to Key Bridge	--[1]	D
Traffic from ramp proceeding across Lynn Street	--[3]	E
Inbound off-ramp to Roosevelt Bridge		
Traffic on ramp	F[5]	B
Junction of inbound off-ramp to Roosevelt Bridge and I-66		
Traffic merging from ramp	E	B
Through-traffic on inbound I-66	D	A
Outbound GWMP between Roosevelt and Key bridges		
Traffic merging from Roosevelt Bridge ramp	B	E
Through-traffic on GWMP	A	D
Intersection of Fort Myer Drive and GWMP on-ramp		
All traffic entering intersection	A	D
Outbound GWMP between Key Bridge and Spout Run		
Traffic merging from Key Bridge ramp	C	F
Traffic diverging to Spout Run Parkway	B	F
Through-traffic on GWMP	B	F

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1. Due to traffic control measures, this maneuver is unimpeded.
2. Due to traffic control measures, this junction is treated as a two-phase, signalized intersection.
3. Due to traffic control measures, traffic is not permitted on the ramp.
4. Low level of service is caused by ramp geometrics rather than volume.
5. Traffic on ramp is typically restricted during the morning peak period because of traffic conditions at the junction with I-66 and Roosevelt Bridge. By definition, level of service is F.

During the evening peak hour, level of service is E or F at the following locations:

junction of the on-ramp from Roosevelt Bridge and outbound GWMP

outbound GWMP between Key Bridge and Spout Run Parkway, including the junction of outbound GWMP and the on-ramp from Key Bridge/Rosslyn

intersection of North Lynn Street and the off-ramp from inbound GWMP

intersection of Lorcom Lane and Spout Run Parkway

VEHICLE OCCUPANCY

Vehicle occupancy is an indicator of the degree to which commuters, in particular, either carpool or vanpool to and from work. The more people who ride in one vehicle, the more efficiently the road system can serve the commuter demand. Vehicle-occupancy counts of vehicles crossing into the central business district were conducted in the fall of 1981 and the spring of 1983, and the data were compared (table 12). In the two-year period, the number of persons traveling into the Washington, D.C., central business district had increased 5 percent; the number of single-occupant automobiles had increased by 15 percent; carpool ridership had increased by 6 percent; and vanpool ridership had increased by 100 percent. Similar counts were made of vehicles crossing the Capital Beltway (I-495/95) in the fall of 1981 and the spring of 1984. These data showed that the number of persons crossing the beltway had increased by 24 percent; carpool ridership had increased slightly; and vanpool ridership in the morning rush hours had increased by 118 percent.

Ridesharing on GWMP and Spout Run Parkway was lower than the average for all the roadways studied. In 1981, the average vehicle occupancy recorded at a counting station on GWMP between Spout Run and Key Bridge was 1.43 persons per vehicle, compared to an average occupancy of 1.48 for all the stations in the study. Similar data for Spout Run Parkway, gathered in 1982, showed roughly the same vehicle-occupancy rate as for GWMP. In 1983 the average vehicle occupancy recorded at the GWMP station was 1.26, compared to an average rate of 1.47 for all stations.

Table 12: Vehicle Occupancy, 1981-1982

Location	Average Vehicle Occupancy				Percent Single Occupany			
	1981	1982	1983	1984	1981	1982	1983	1984
Capital Beltway (I-495/95) cordon line								
All stations 6:30 to 9:30 a.m.	1.30[a]	--	--	1.33[b]	80.1[a]	--	--	80.1[b]
GWMP 6:30 to 9:30 a.m.	1.35[a]	--	--	1.31[b]	76.5[a]	--	--	79.3[b]
GWMP (between beltway and Dead Run Creek) 6:00 to 9:15 a.m.	--	1.26[c]	--	--	--	80.0[c]	--	--
GWMP (between beltway and Dead Run Creek) 3:30 to 6:25 p.m.	--	1.39[c]	--	--	--	75.8[c]	--	--
Core (central business district) cordon line								
All stations 6:30 to 9:30 a.m.	1.48[d]	--	1.47[e]	--	67.6[d]	--	70.4[e]	--
GWMP 6:30 to 9:30 a.m.	1.43[d]	--	1.26[e]	--	68.6[d]	--	80.9[e]	--
GWMP (north of Spout Run)								
6:30 to 9:30 a.m.	--	1.43[f]	--	--	--	73.2[f]	--	--
Spout Run								
6:30 to 9:30 a.m.	--	1.42[g]	--	--	--	69.1[g]	--	--
Spout Run								
4:00 to 6:30 p.m.	--	1.41[g]	--	--	--	69.3[g]	--	--

Sources:
a. MWCOG fall 1981 beltway cordon count
b. MWCOG spring 1984 beltway cordon count
c. VDH&T count on September 22, 1982
d. MWCOG spring 1981 core cordon count
e. MWCOG spring 1983 core cordon count
f. MWCOG count on November 11, 1982
g. NPS, DSC, count on November 9, 1982

Environmental Consequences

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IMPACTS ON PARKWAY VALUES

VISUAL QUALITY

The most significant potential for impacts on scenic quality would occur at the Spout Run merge (inbound), near Key Bridge, and across from the Theodore Roosevelt Island parking lot. Sketches have been provided to show how the construction of retaining walls in alternatives C and D would considerably alter the character of the parkway. To mitigate the impact wherever retaining walls were used, their height would be restricted to between 3 and 4 feet wherever possible, they would be faced with rock, and appropriate plant materials would be added where space was available.

Cut and fill would also detract from scenic values by disturbing the established vegetation. This impact is addressed under "Natural Resources," below.

During the preliminary design phase, and on a case-by-case basis, each road section would be evaluated for the applicability and use of cut-and-fill slopes or retaining walls or a combination of the two. The cross sections included in this report are intended to generally illustrate the probable magnitude of the visual change at specific locations along the parkway.

Alternative A

The visual quality of the parkway would be enhanced by rebuilding the curbs, putting a rock face on the Key Bridge on-ramp abutment, developing and implementing a landscape plan, and replacing the existing guardrails with less obtrusive materials. The use of reflective markings, guardrails, and signs to improve traffic safety would have a minor adverse effect on the visual quality of the parkways. Standards for protecting parkway values would be developed in the future, and all safety and other improvements would conform with the standards. During the period when roadwork was in progress, the signs needed to route traffic would create a short-term adverse effect on scenic quality.

Alternative B

The structural changes included in alternative B would result in a moderate change in the aesthetic character of the parkway. Overall, 3.74 acres of greenspace--grass, shrubs, and trees--would be replaced with paved surfaces to extend the acceleration and deceleration lanes for the ramps and merge areas, add a third lane to outbound GWMP between Key Bridge and Spout Run, improve the access to the Theodore Roosevelt Island parking lot, and reconstruct the Key Bridge off-ramp. A more detailed description of the vegetation loss is included under "Natural Resources," below.

Widening portions of GWMP from two to three lanes would create a significant visual change. There would be a further highly noticeable change created by the loss of the tree canopy along the new 1,200-foot Spout Run/GWMP merge area. The construction of a third lane over the rock escarpment at the Spout Run merge would open up a key view of the river and the Georgetown waterfront.

The Key bridge off-ramp improvement and the lengthened deceleration lane at Roosevelt Bridge would have no significant visual impact.

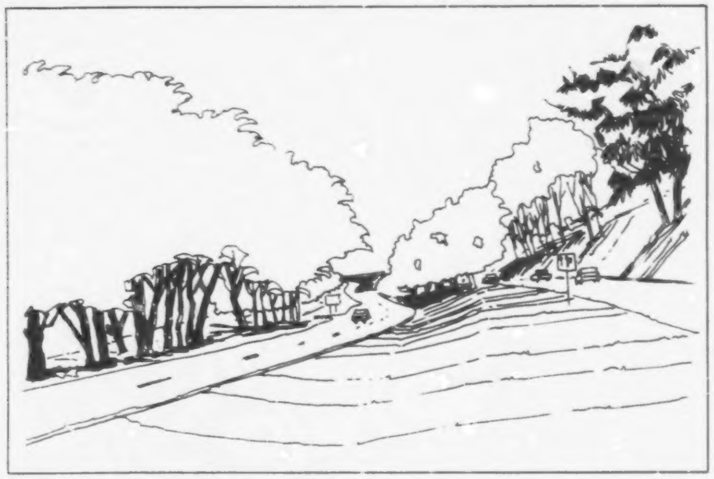
Alternative C

The visual impacts described for alternative B would be more extensive under this alternative. Overall, 4.19 acres of greenspace would be replaced with paved surfaces. The third inbound lane originating at Spout Run would extend all the way to the Key Bridge/Rosslyn Circle off-ramp, resulting in the loss of an additional 2,400 linear feet of landscaped area. The new stacking lane for the off-ramp to Roosevelt Bridge would be constructed on a steep wooded embankment that currently serves as an important visual buffer between the commercial highrise buildings of Rosslyn and the parkway corridor and Theodore Roosevelt Island. The construction of the new ramp would result in the removal of some 500 linear feet of this woodland barrier. Some post-construction landscaping would be accomplished, but the wooded screen serving to buffer the commercial appearance of Rosslyn would be lost and could not be replaced. This would constitute a severe adverse effect on the aesthetic qualities of GWMP and Theodore Roosevelt Island.

Alternative D

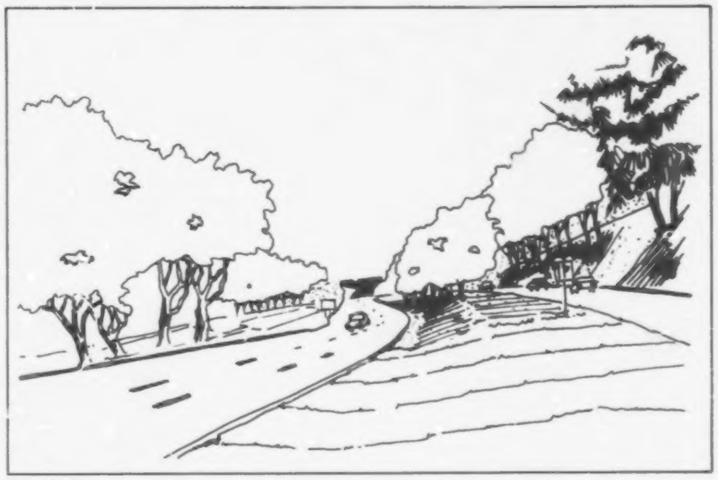
Alternative D would have the most severe impacts on scenic values. A total of 4.93 acres would be converted from greenspace to paved surfaces in the course of adding new third lanes to the entire length of both the inbound and the outbound roadways and a new fourth lane to outbound GWMP between Key Bridge and Spout Run. The parkway's visual and spatial organization would be considerably altered by its conversion to a six-lane freeway. The ratio of paved surfaces to greenspace would change considerably with a 33 percent increase in pavement over what now exists, and many pictorial elements--vegetative screens, frames, dividers, and borders--would be lost. In addition to the impacts described for alternatives B and C, the construction of a new off-ramp to Key Bridge would require the replacement of a steep wooded embankment with a double wall 30 feet high, destroying a natural landform and introducing a massive structural element that would be evident to parkway travelers and pedestrians on Key Bridge. The cumulative effect of all these actions would be to destroy the relationship between the roadway and the natural landscape. Thus, the traditional concept of the parkway being parkland containing a road, and not just a roadway, would be lost. The former parkway would be reduced to an urban interstate with landscaping.

ALTERNATIVE A



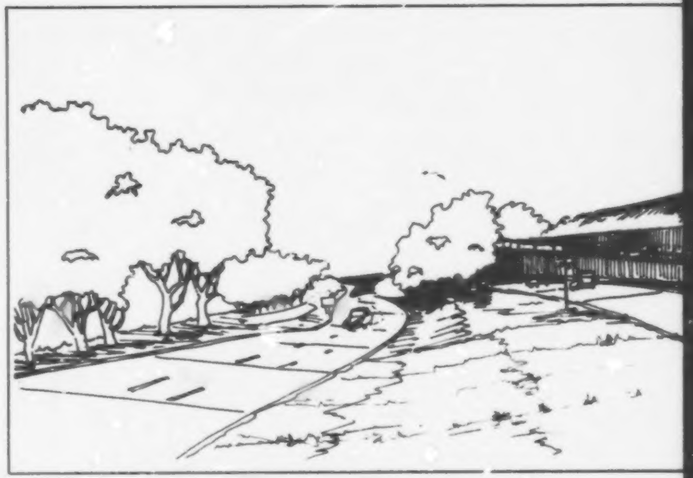
Inbound view Theodore Roosevelt Island and I-66 bridge. Parkway values: Treed parkway edges and median are effective buffers for park users. The thinly wooded sloped bank to the right barely buffers I-66 and the commercial development adjoining in Rosslyn. Parkway right-of-way opposite Theodore Roosevelt Memorial is very narrow. Any major new construction will negate park values that are fragile in this zone. Post construction landscape restoration measures will offer little to mitigate.

ALTERNATIVE B



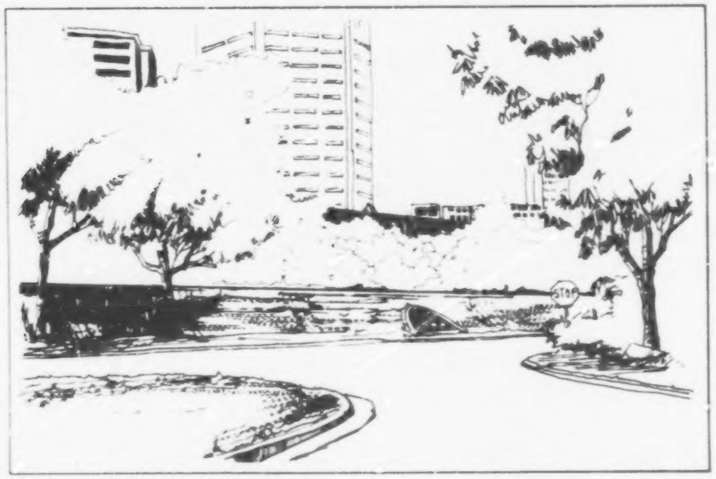
Parkway's on ramp from the Theodore Roosevelt Bridge will result in the loss of approximately 1,000 feet of grass area. An additional 1,000 feet of grass median will also be lost as a result of the construction of new acceleration and deceleration lanes in and out of the Theodore Roosevelt Memorial parking area.

ALTERNATIVE C



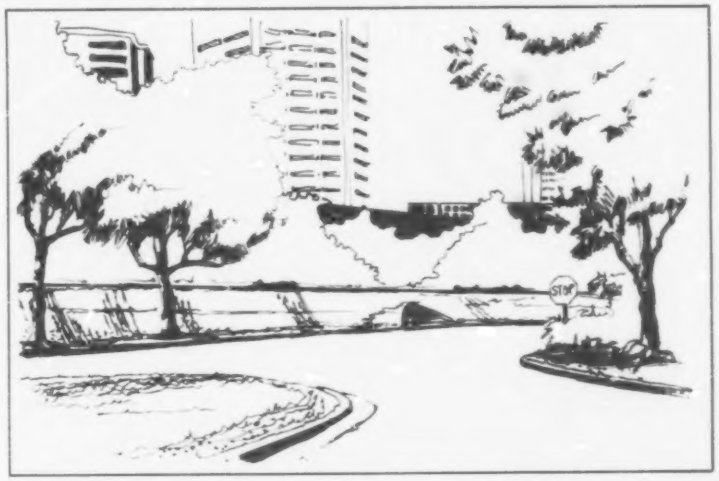
Same construction features as alternative B, with t difference as follows: the inbound off ramp (stacking lan to I-66 would severely impact the thinly wooded steep ban The wooded screen would be removed, the slope regraded accommodate the off ramp and two retaining walls would required to stabilize the sloping ground. The parkway wou lose an important buffer now shielding the Theodo Roosevelt Memorial Island complex. Though mitigati through some replanting is possible, the parkway's right- way is too crimped to allow replacement through use mature trees

ALTERNATIVE A



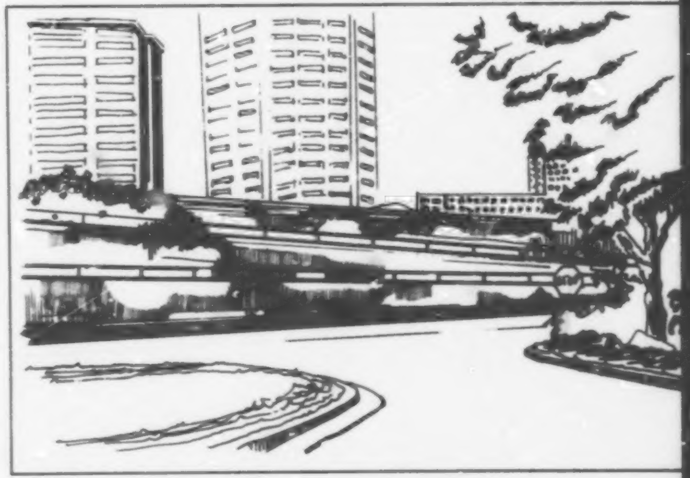
Existing view Theodore Roosevelt Island parking lot to Rosslyn offscape. Parkway value: Thin vegetative cover as shown across from the Theodore Roosevelt Island parking area that provides a screen for the massive scale of the Rosslyn commercial area and adjacent I-66 right-of-way. Also important in retaining parkway character in this narrow roadway segment and for enhancing scenic views from Theodore Roosevelt Island and pedestrian bridge.

ALTERNATIVE B



Some foreground green space along outbound parkway would be lost due to lengthened acceleration lane coming off of Theodore Roosevelt Bridge as well as improved acceleration and deceleration lanes in and out of parking area.

ALTERNATIVE C



Through this segment of alternative C. parkway characte transformed into an urban expressway. The fragile vegetati that separates I-66 and Rosslyn can no longer be retained accommodate lane widening and the I-66 off ramp (stack lane) with attendent retaining walls. The outbound parkw impacts in this view would be the same as alternative

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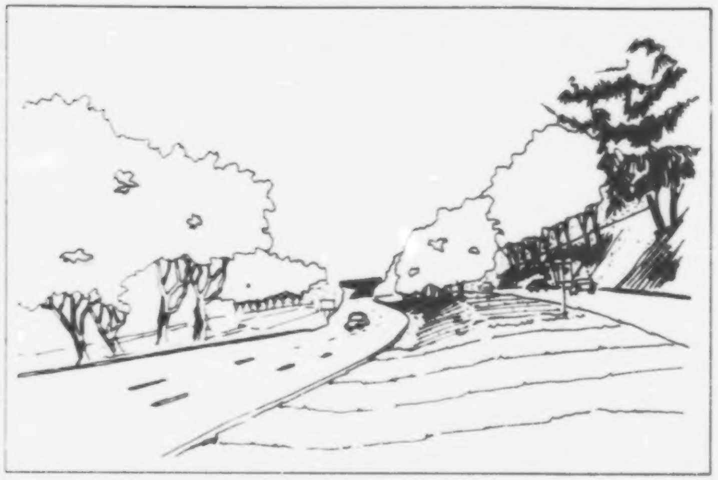
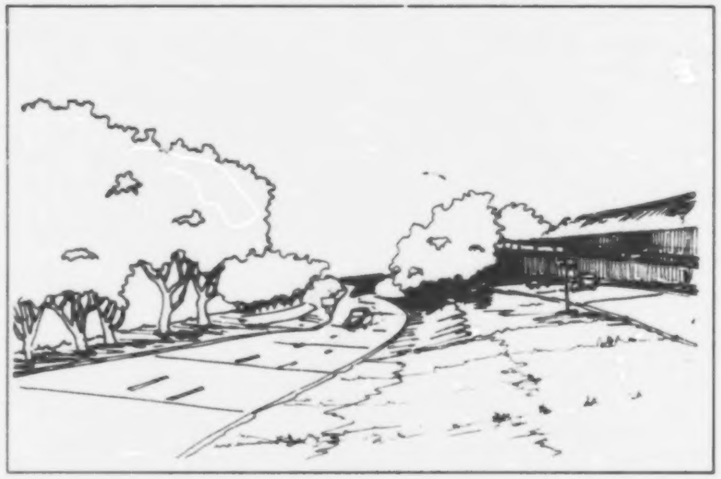


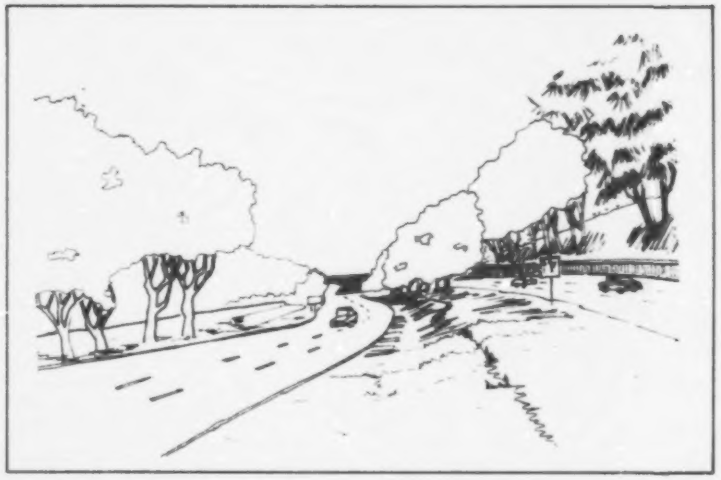
Parkway's on ramp from the Theodore Roosevelt Bridge will result in the loss of approximately 1,000 feet of grass area. An additional 1,000 feet of grass median will also be lost as a result of the construction of new acceleration and deceleration lanes in and out of the Theodore Roosevelt Memorial parking area.

ALTERNATIVE C



Same construction features as alternative B, with the difference as follows: the inbound off ramp (stacking lane) to I-66 would severely impact the thinly wooded steep bank. The wooded screen would be removed, the slope regraded to accommodate the off ramp and two retaining walls would be required to stabilize the sloping ground. The parkway would lose an important buffer now shielding the Theodore Roosevelt Memorial Island complex. Though mitigation through some replanting is possible, the parkway's right-of-way is too crimped to allow replacement through use of mature trees.

ALTERNATIVE D



In alternative D, the lengthening of the I-66 off ramp would require a 500-foot retaining wall along the inbound roadway to be placed into the slope to create the extra lane. In this stretch, the parkway would total three lanes inbound and three lanes outbound, plus the added acceleration and deceleration lanes into the Theodore Roosevelt Memorial Island parking lot. Much of the vegetated median would also be lost.

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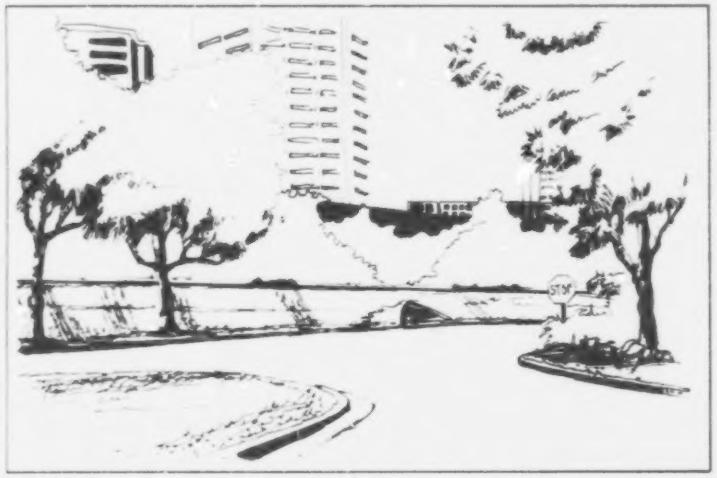
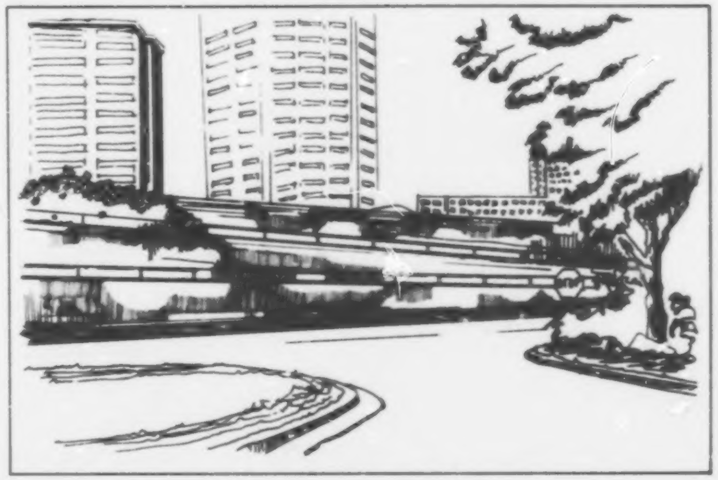
ALTERNATIVE B



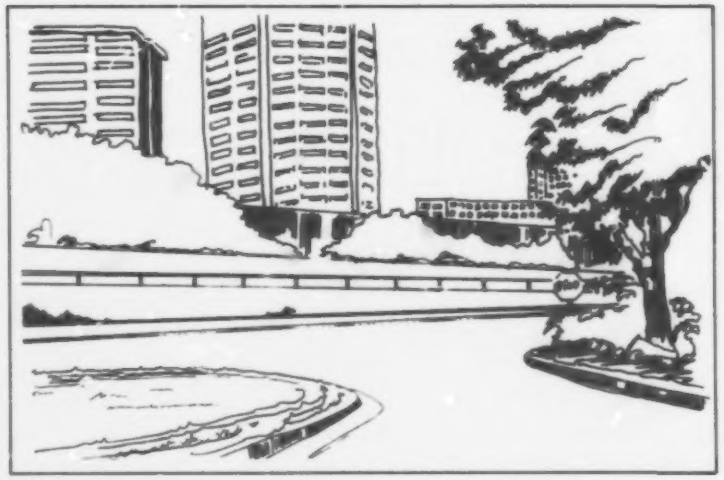
Some foreground green space along outbound parkway would be lost due to lengthened acceleration lane coming off of Theodore Roosevelt Bridge as well as improved acceleration and deceleration lanes in and out of parking area.

ALTERNATIVE C



Through this segment of alternative C, parkway character is transformed into an urban expressway. The fragile vegetation that separates I-66 and Rosslyn can no longer be retained to accommodate lane widening and the I-66 off ramp (stacking lane) with attendent retaining walls. The outbound parkway impacts in this view would be the same as alternative B.

ALTERNATIVE D



Inbound, the existing Rosslyn vegetative screen will be lost due to retaining walls and removal of mature trees and other vegetation that will be required to add a third lane into the Theodore Roosevelt Bridge on-ramp. Outbound, the existing vegetated median will also need to be removed. Here, another retaining wall will be required so as to minimize the area used on the foreground side of the parkway. This is done so as to not further narrow the Theodore Roosevelt Island parking area and Little River shoreline environs.

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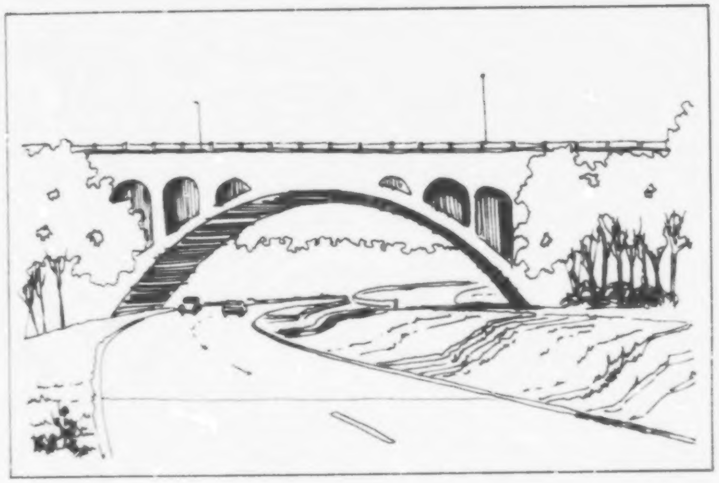
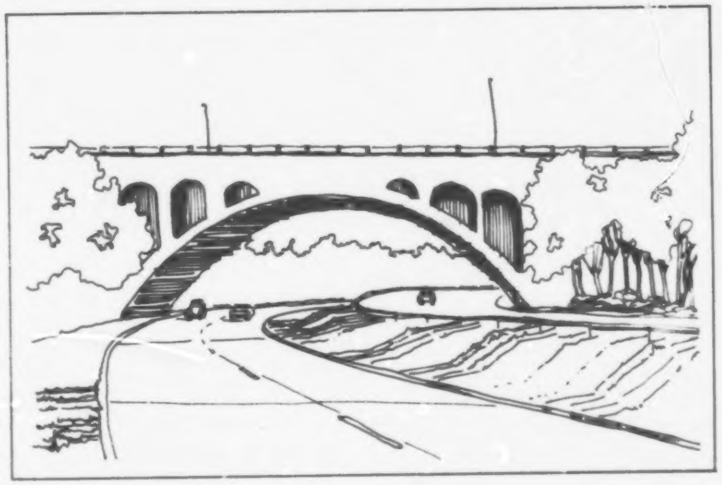
ALTERNATIVE A



Key Bridge (inbound). Parkway value: At Key Bridge, a focal parkway feature, the park assumes two distinct experiential units. Northward, the more rural parkway traverses suburban/rural countryside; the palisades, and the Potomac Valley. Offscapes of the natural landscape feature Georgetown and National Capital monuments. Southward, the parkway bisects a convoluted network of highways, and widens out as it transects denser land use, National Airport, and numerous bridges into the District of Columbia. Major elements at Key Bridge that distinguish parkway character are balance between structural and landscape elements, the wide median and grade differential between lanes, the sweeping curve, and generous greensward of grass and mass plantings. Despite past construction, the parkway retains these distinguishing characteristics parkways are noted for.

ALTERNATIVE B



Changes to parkway will result in alternatives B and C by widening of the inbound lane to add a deceleration ramp for the Key Bridge off ramp. Some loss of median is required to maintain two lane flow of inbound traffic. However, parkway character remains largely intact in this parkway segment under both alternatives.

ALTERNATIVE C

SAME AS ALTERNATIVE B

SAME AS ALTERNATIVE B

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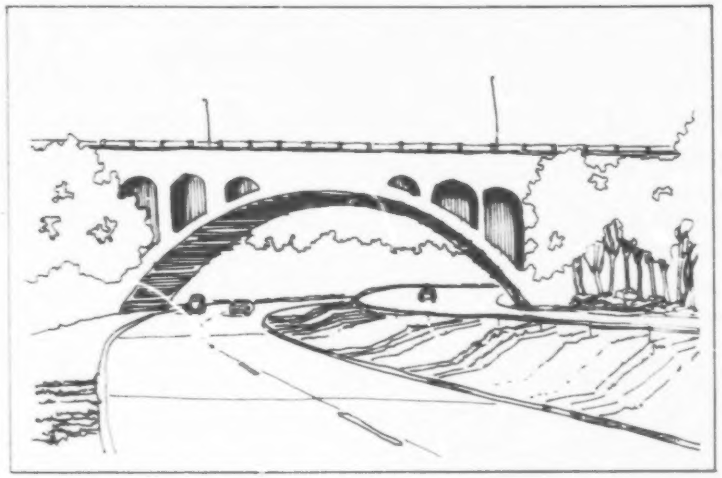
ALTERNATIVE B



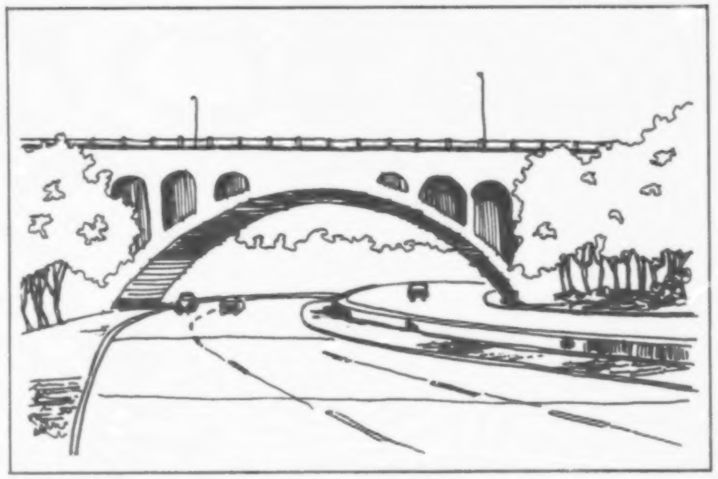
Changes to parkway will result in alternatives B and C by widening of the inbound lane to add a deceleration ramp for the Key Bridge off ramp. Some loss of median is required to maintain two lane flow of inbound traffic. However, parkway character remains largely intact in this parkway segment under both alternatives.

ALTERNATIVE C

SAME AS ALTERNATIVE B

SAME AS ALTERNATIVE B

ALTERNATIVE D



Alternative D requires extensive alteration to historic parkway scale; from parkway to an urban expressway, with landscaping – six lanes overall flow inbound and outbound. A seventh lane at Key Bridge facilitates off parkway traffic to Key Bridge. Parkway is taking on an interstate appearance that completely departs from historical distinguishing character. In this parkway segment, the existing vegetated median would be lost and paved surfaces would dominate the view of the parkway user.

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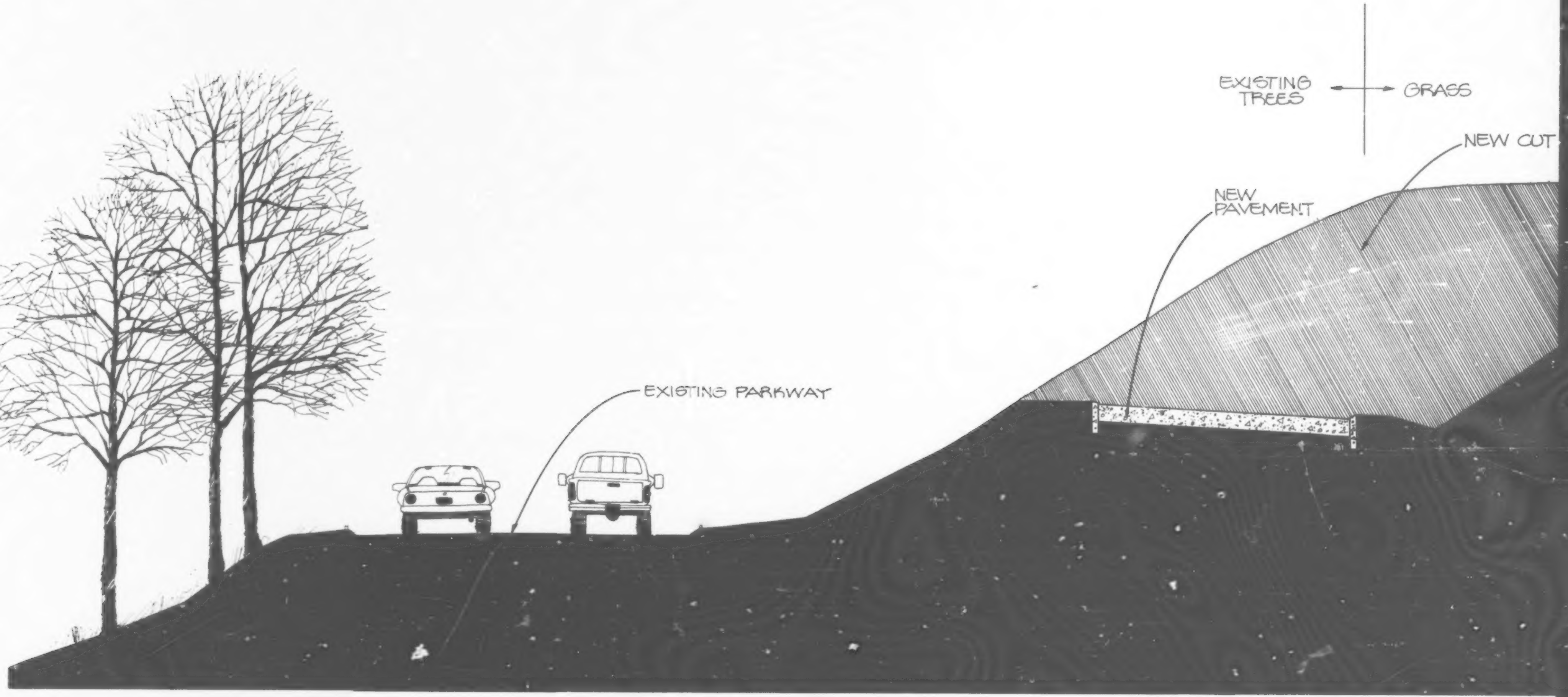
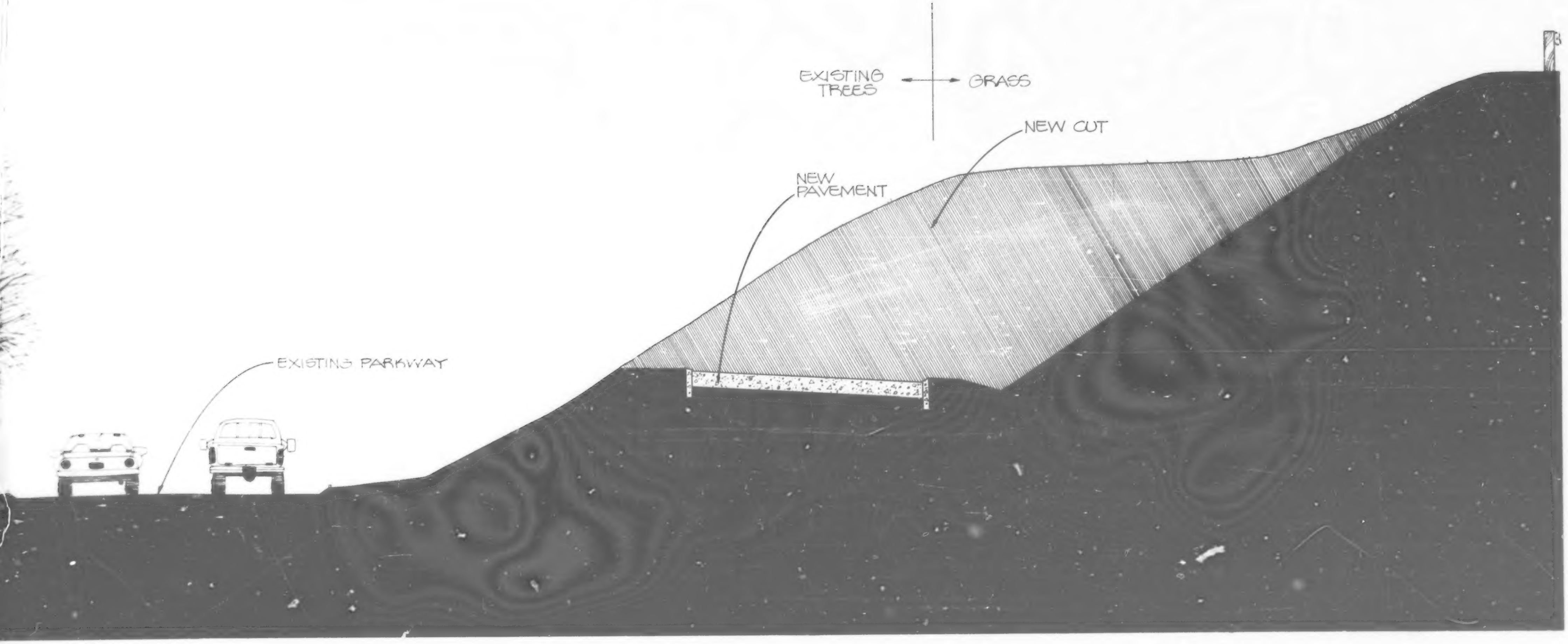


ALTERNATIVE C
VIEW OF STACKING LANE OFF INBOUND PARKWAY



ALTERNATIVE C
VIEW OF STACKING LANE OFF INBOUND PARKWAY

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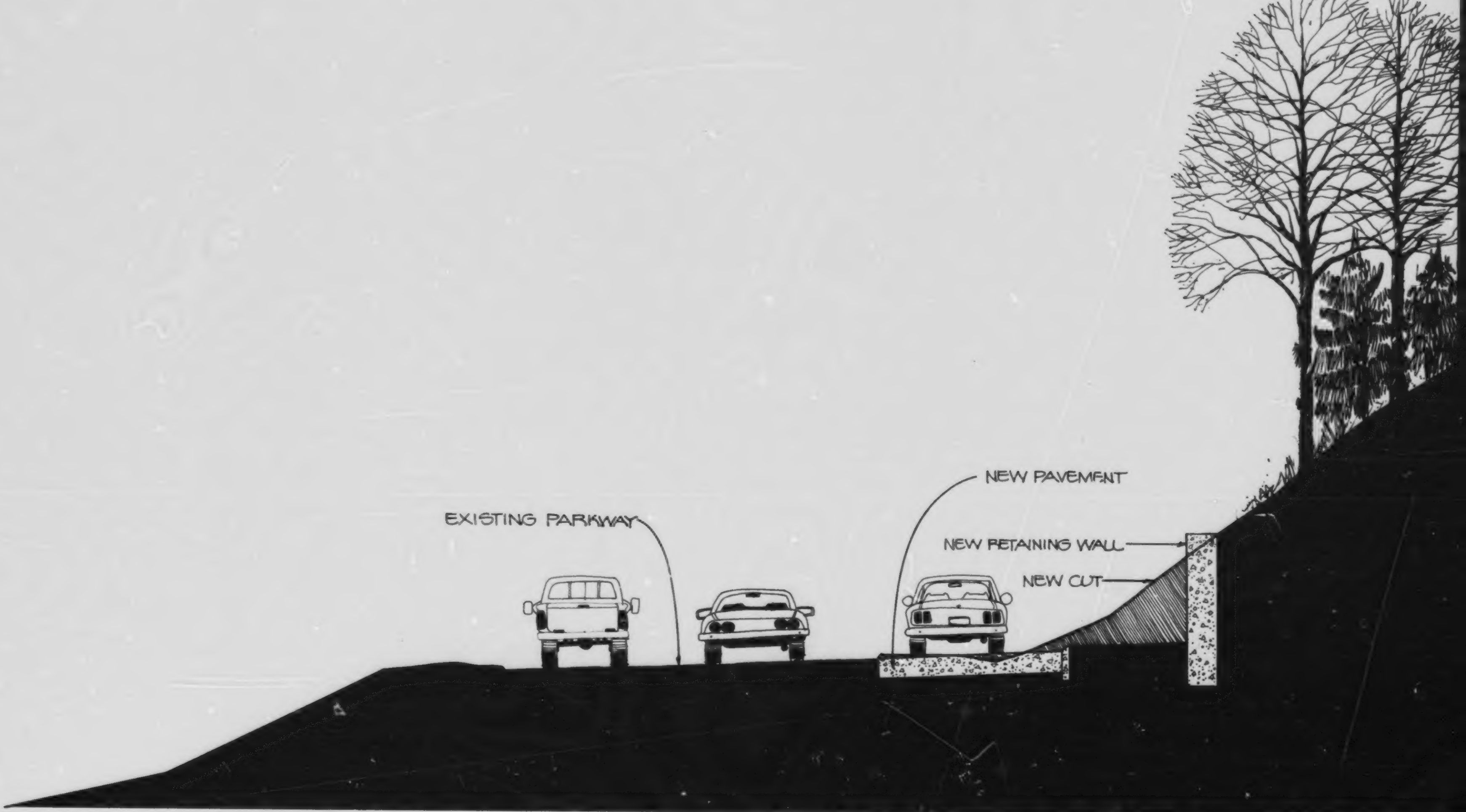
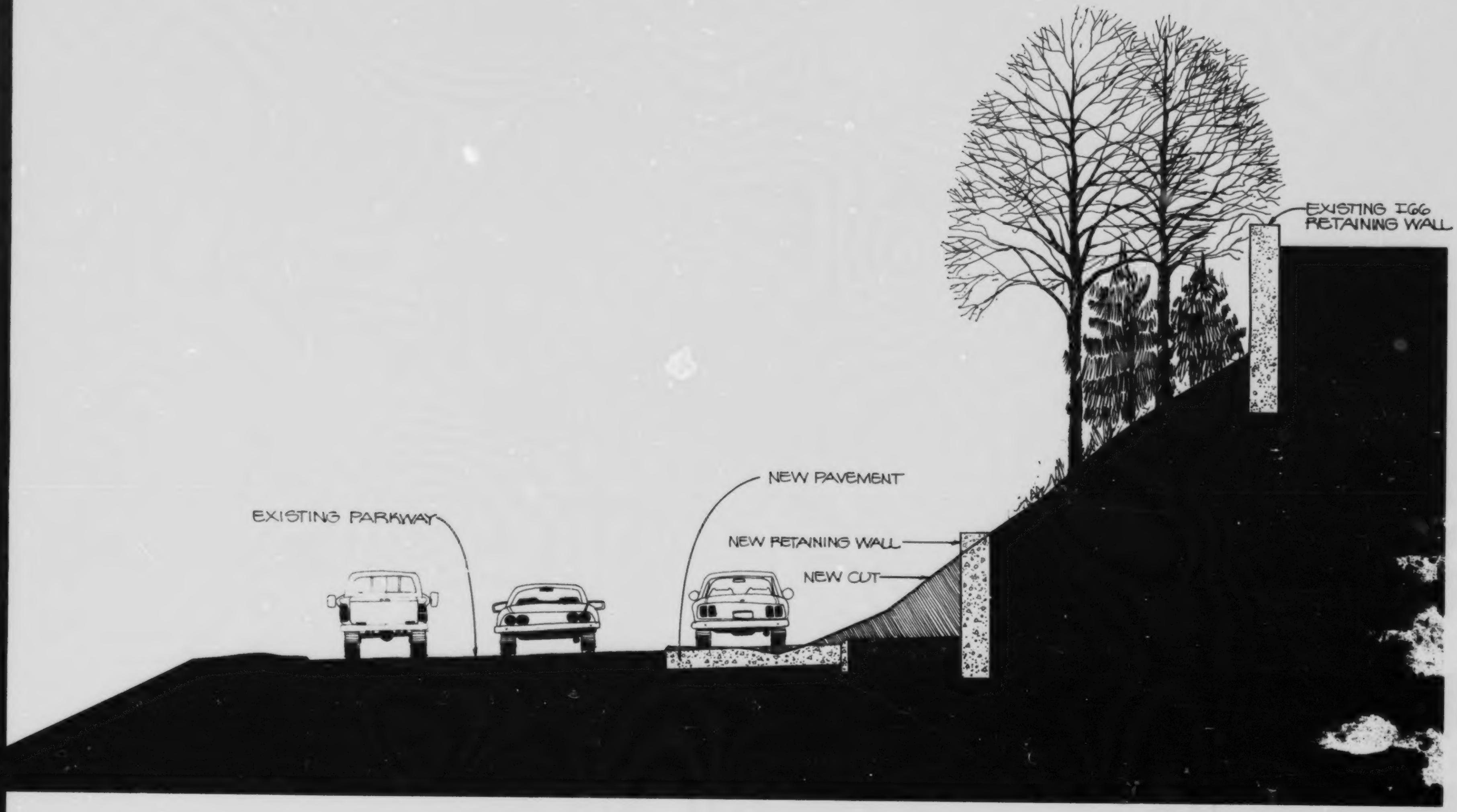


ALTERNATIVES C AND D
VIEW OF INBOUND PARKWAY ACROSS FROM
THEODORE ROOSEVELT ISLAND PARKING AREA



ALTERNATIVES C AND D
VIEW OF INBOUND PARKWAY ACROSS FROM
THEODORE ROOSEVELT ISLAND PARKING AREA

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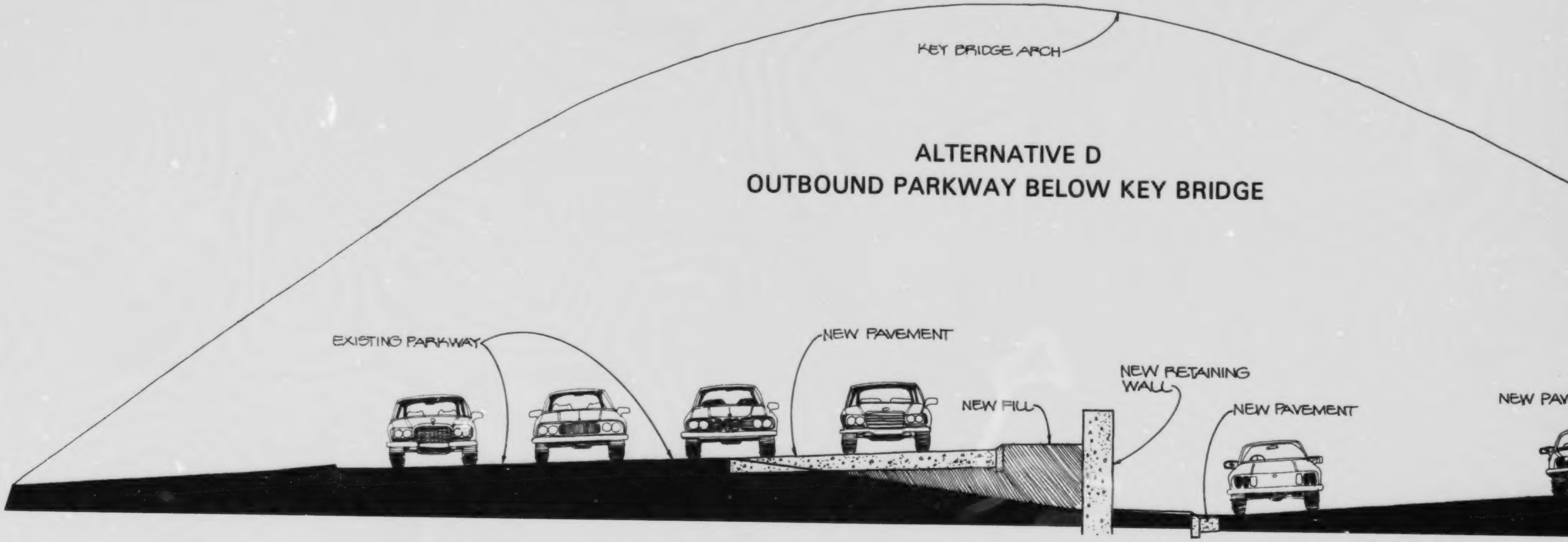
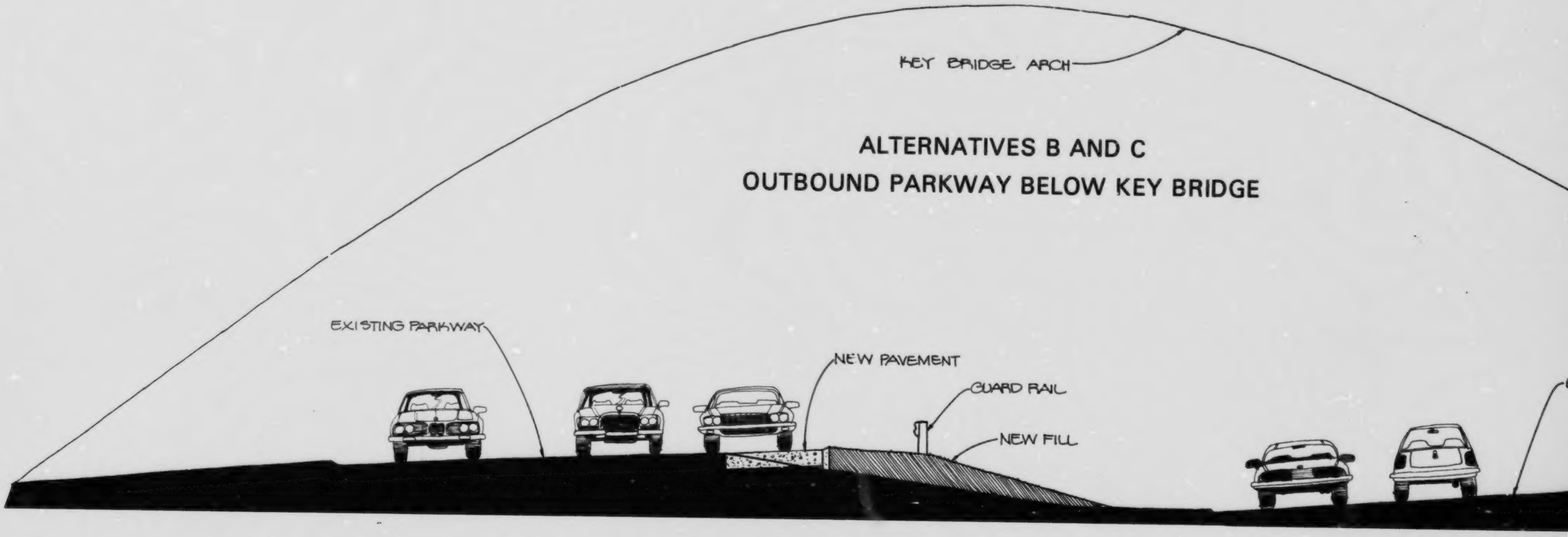
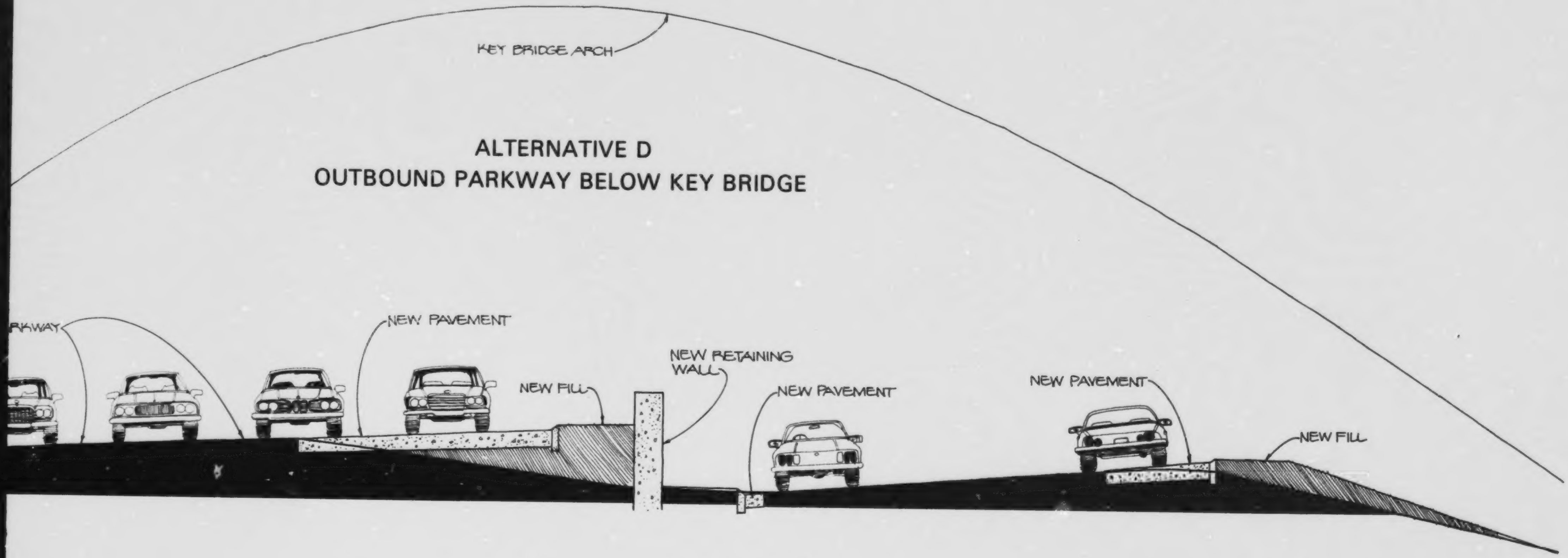


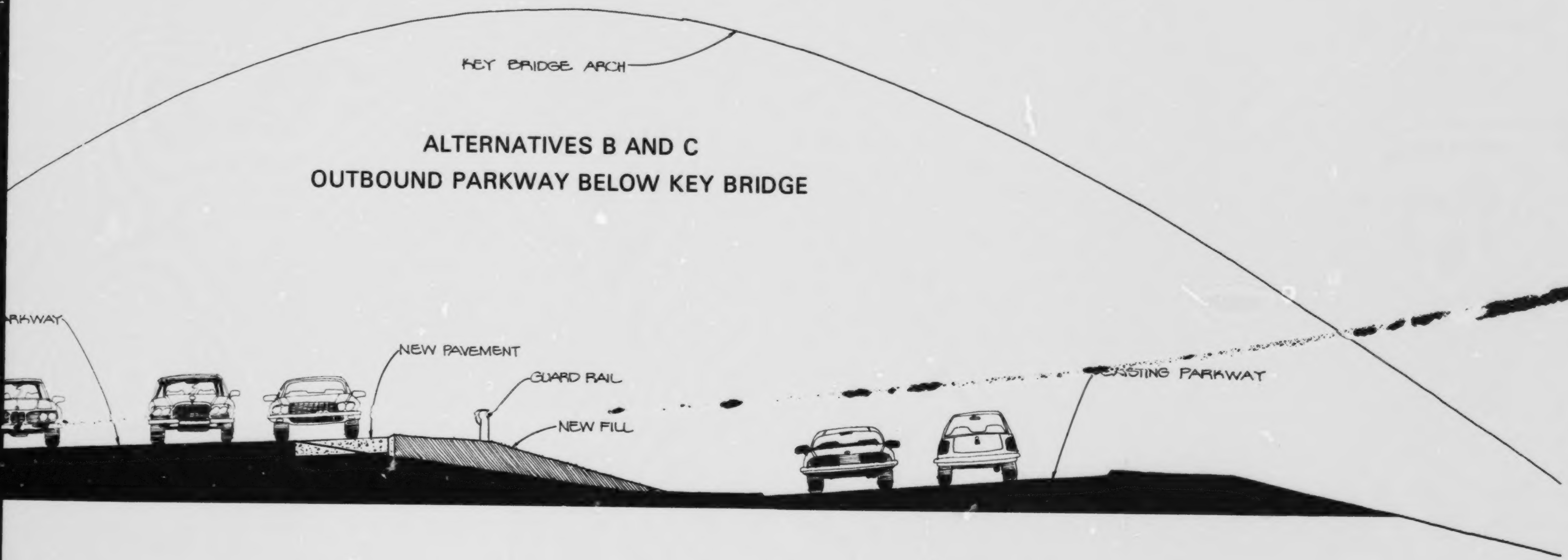
ALTERNATIVE D
OUTBOUND PARKWAY BELOW KEY BRIDGE



ALTERNATIVES B AND C
OUTBOUND PARKWAY BELOW KEY BRIDGE



ALTERNATIVE D
OUTBOUND PARKWAY BELOW KEY BRIDGE



ALTERNATIVES B AND C
OUTBOUND PARKWAY BELOW KEY BRIDGE

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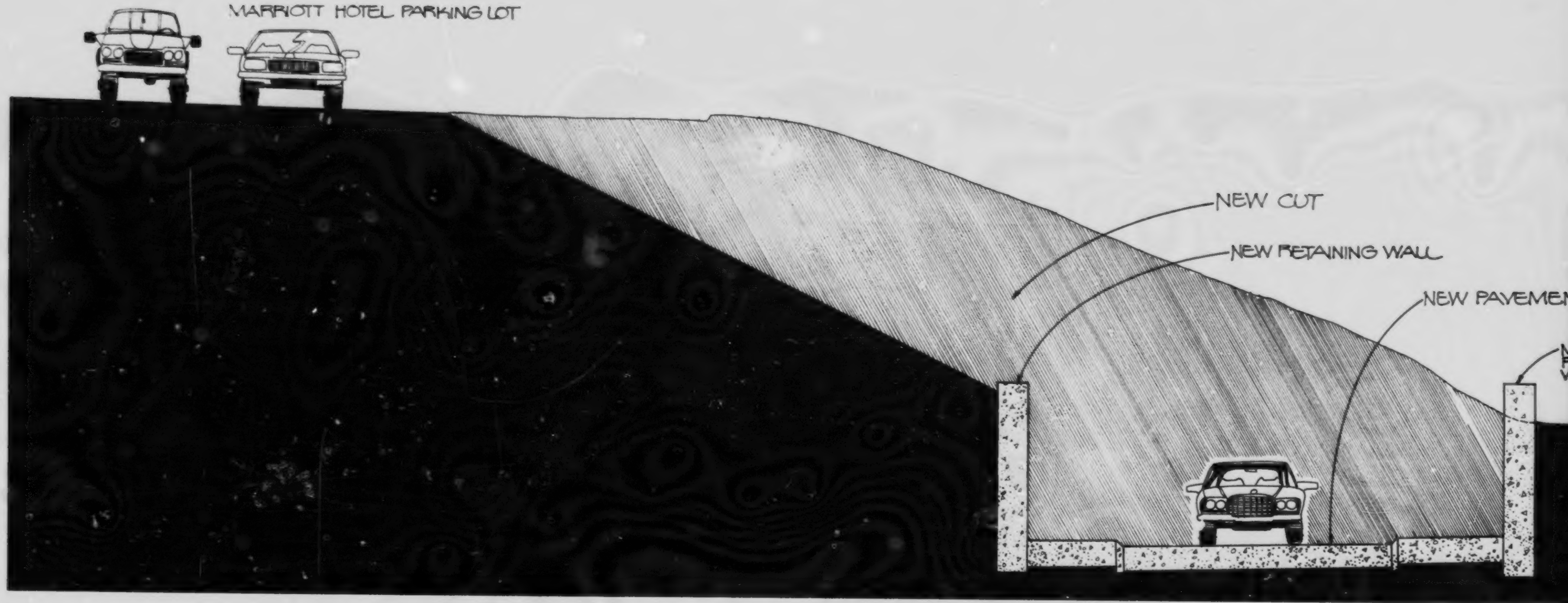
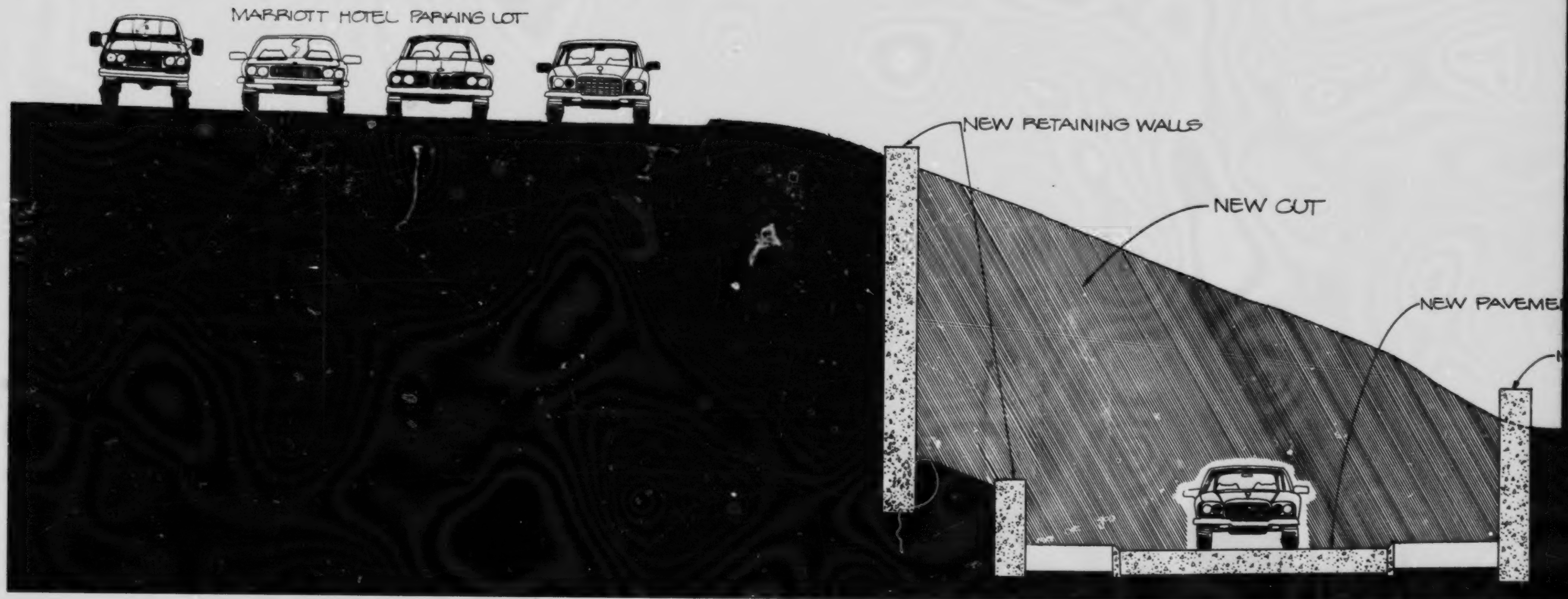
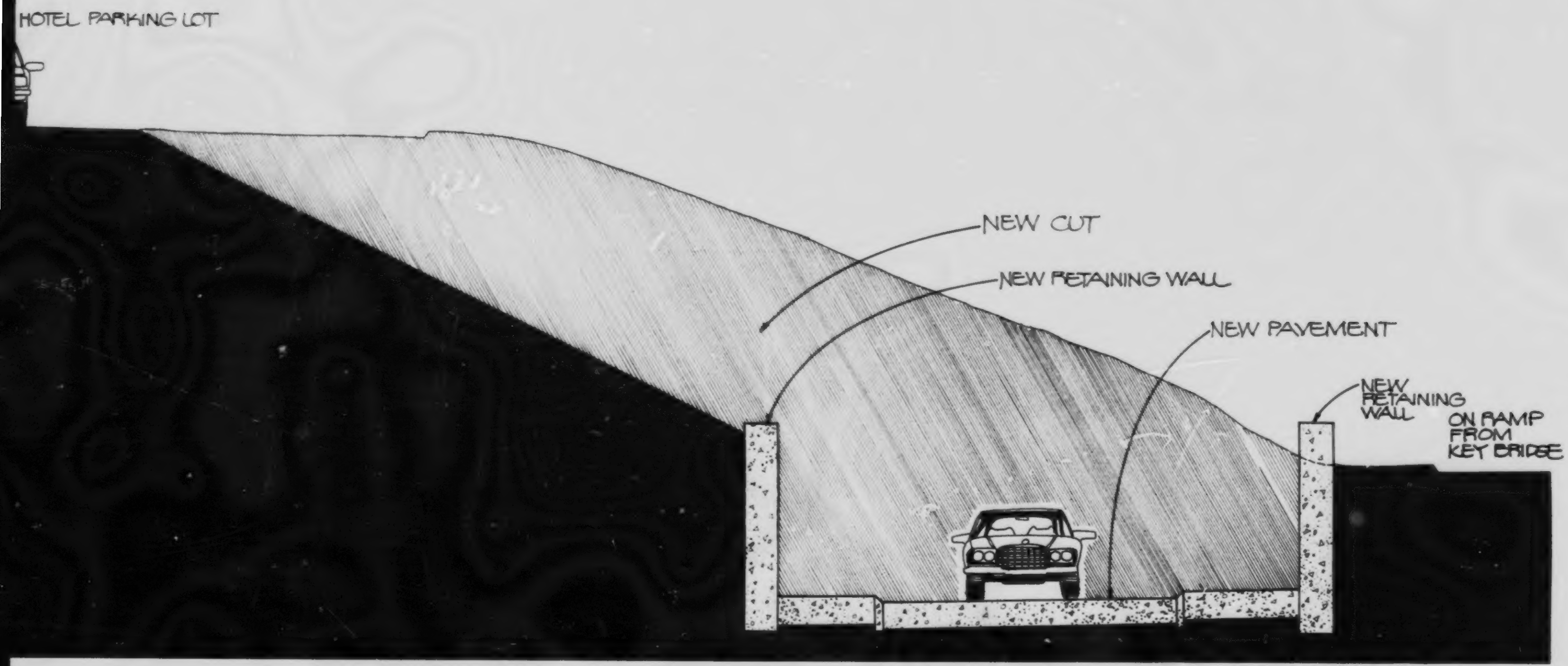


ALTERNATIVE D
NEW OFF RAMP TO ROSSLYN CIRCLE FROM
INBOUND PARKWAY WITH R.O.W. PURCHASE

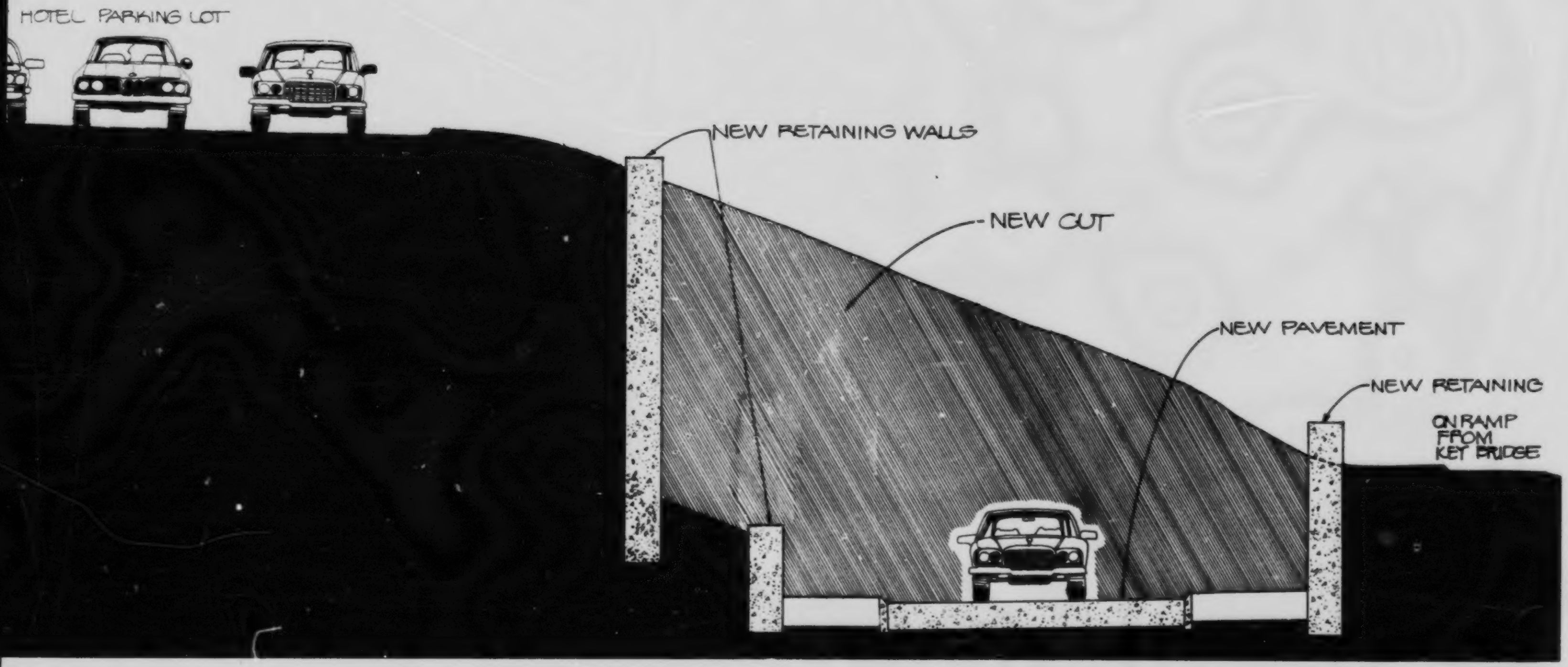


ALTERNATIVE D
NEW OFF RAMP TO ROSSLYN CIRCLE
FROM INBOUND PARKWAY WITHOUT R.O.W.

73A



ALTERNATIVE D
NEW OFF RAMP TO ROSSLYN CIRCLE FROM INBOUND PARKWAY WITH R.O.W. PURCHASE



ALTERNATIVE D
NEW OFF RAMP TO ROSSLYN CIRCLE FROM INBOUND PARKWAY WITHOUT R.O.W.

73

73A

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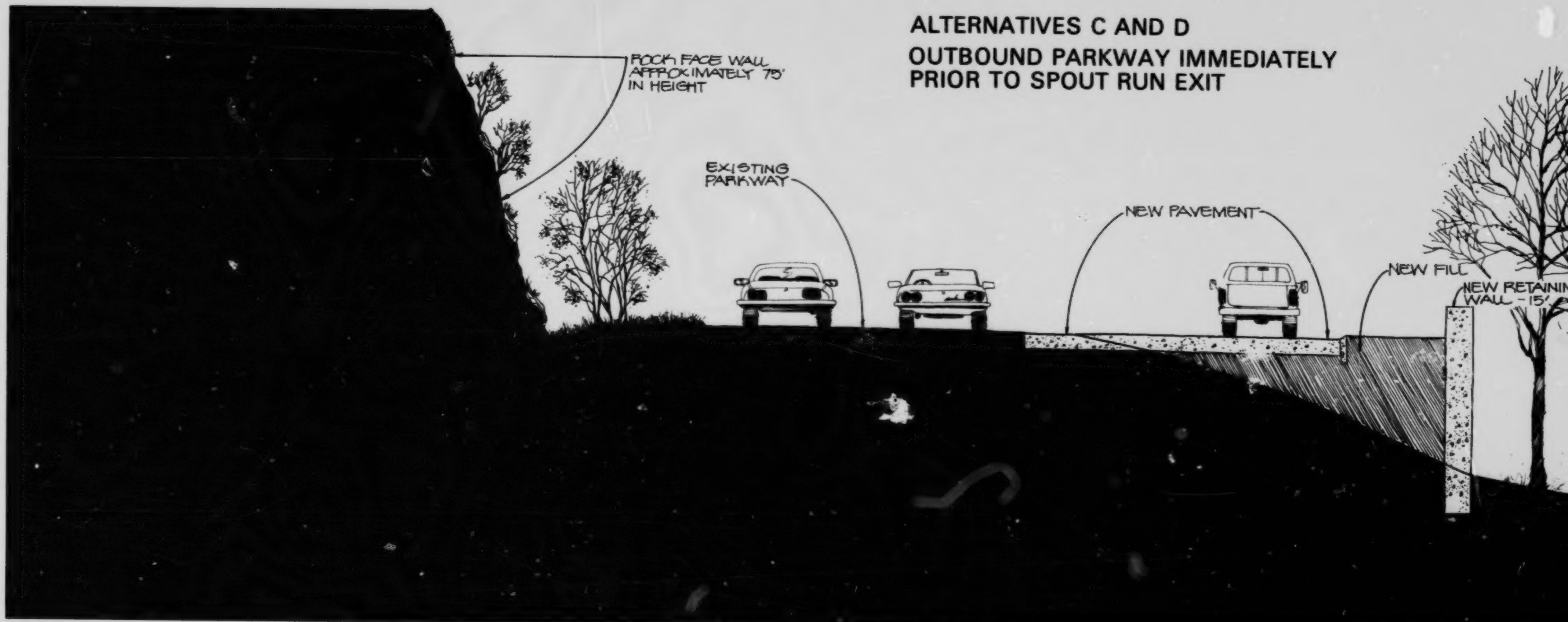
ALTERNATIVES C AND D
OUTBOUND PARKWAY IMMEDIATELY PRIOR TO SPOUT RUN EXIT



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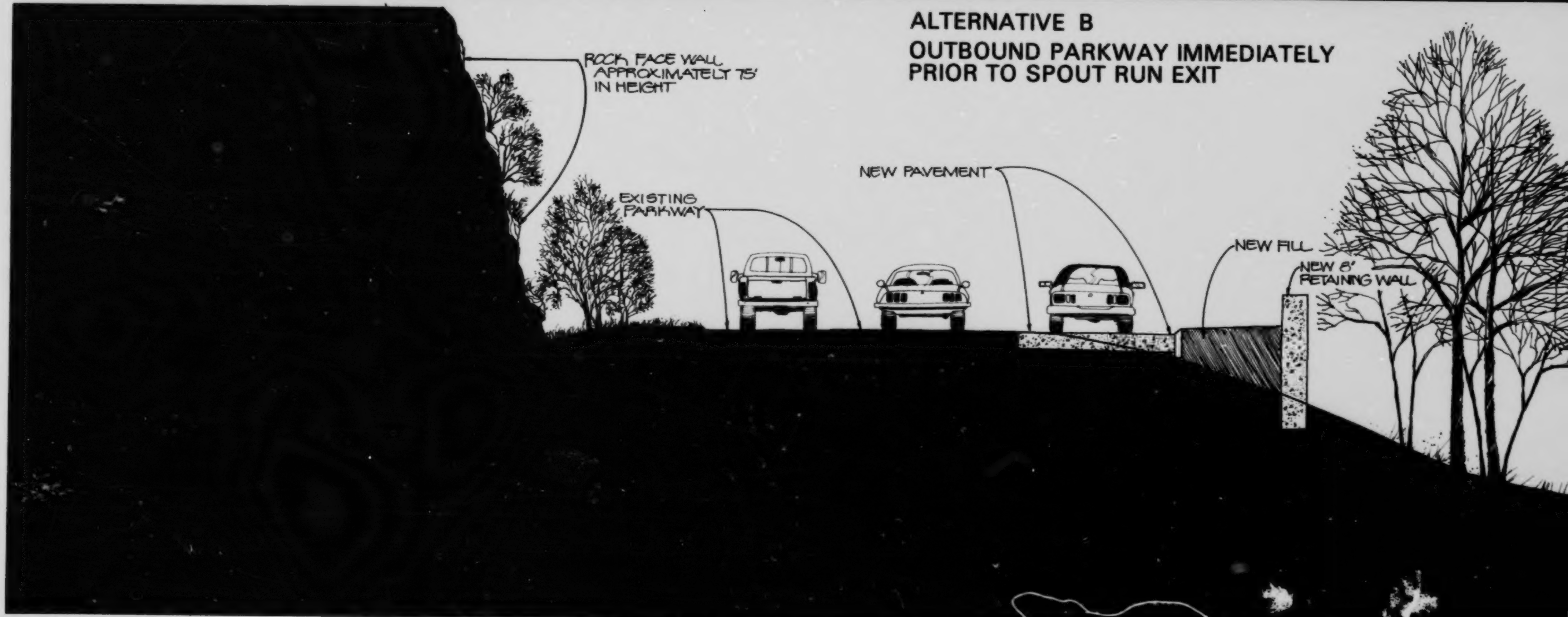
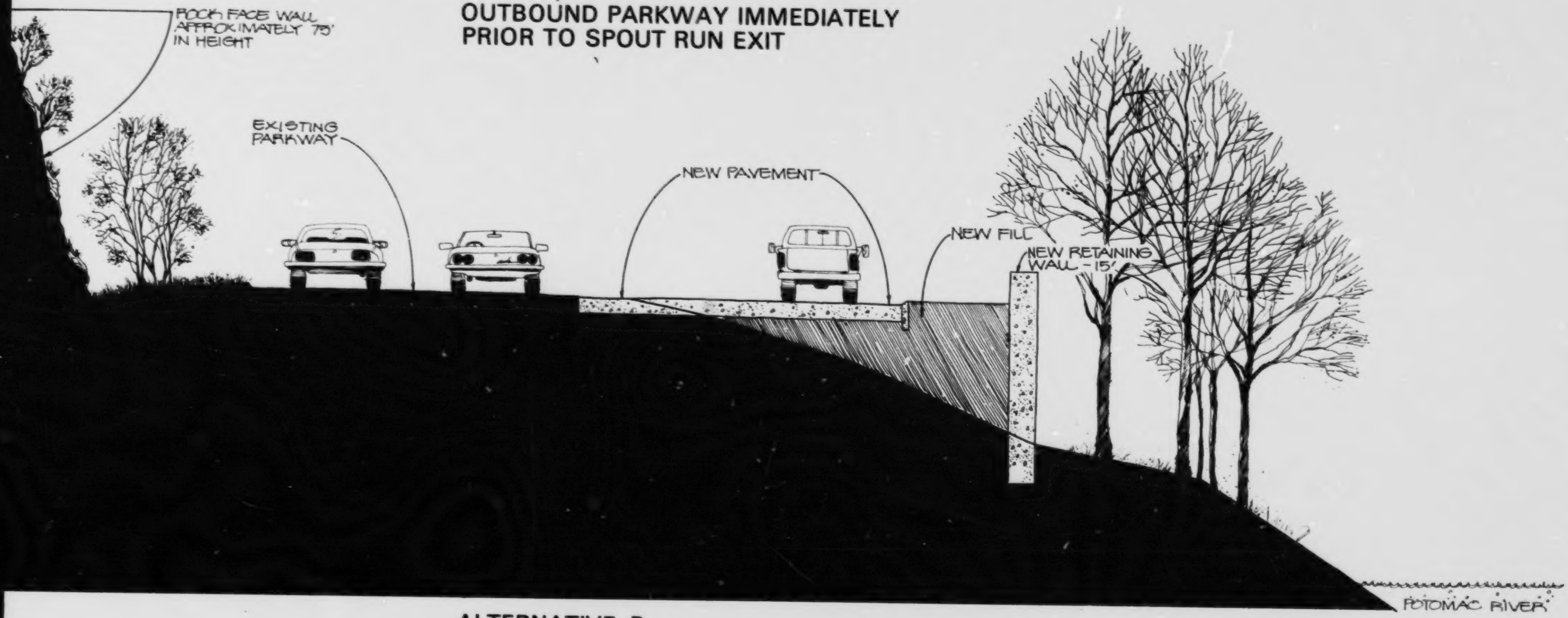
OUTBOUND PARKWAY IMMEDIATELY PRIOR TO SPOUT RUN EXIT



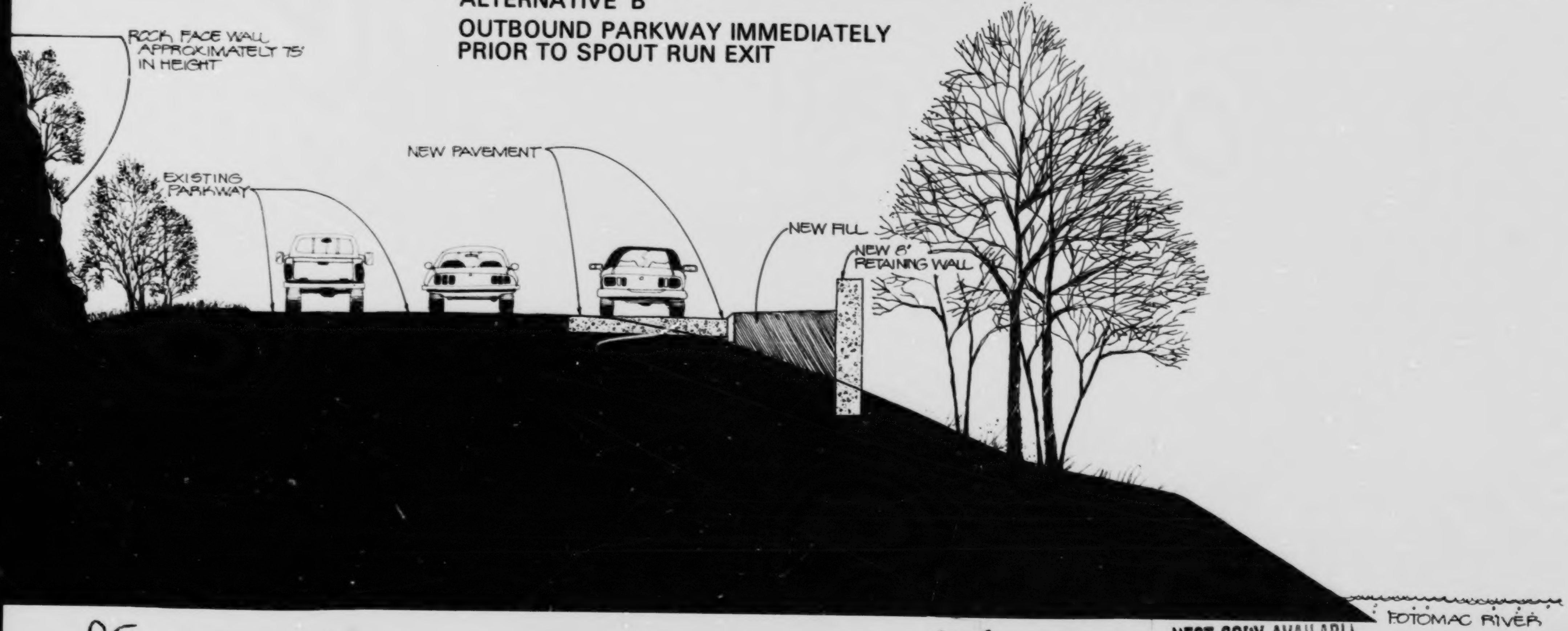
ALTERNATIVES C AND D

OUTBOUND PARKWAY IMMEDIATELY PRIOR TO SPOUT RUN EXIT



ALTERNATIVE B

OUTBOUND PARKWAY IMMEDIATELY PRIOR TO SPOUT RUN EXIT



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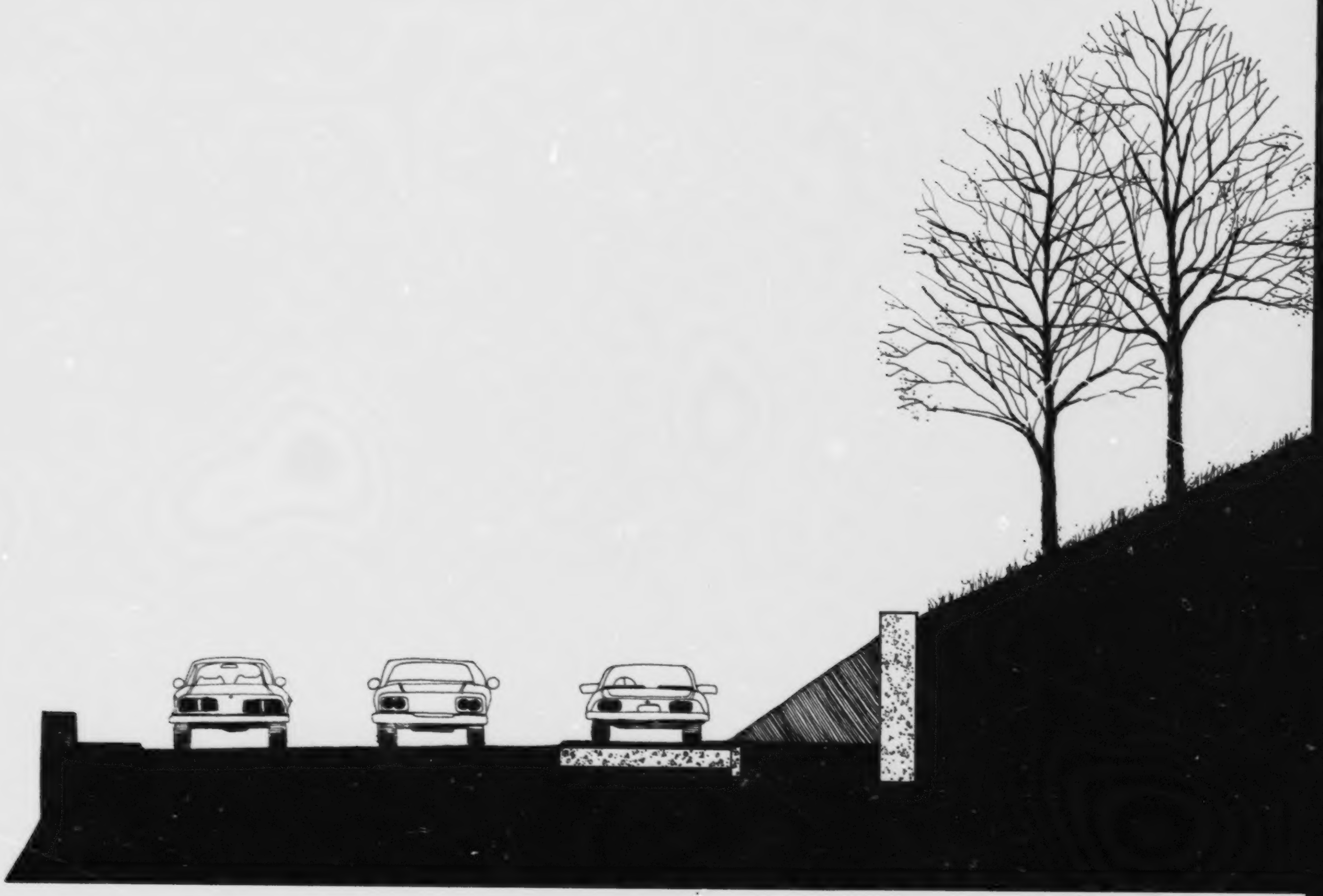

ALTERNATIVE B
INBOUND PARKWAY AT SPOUT RUN MERGE

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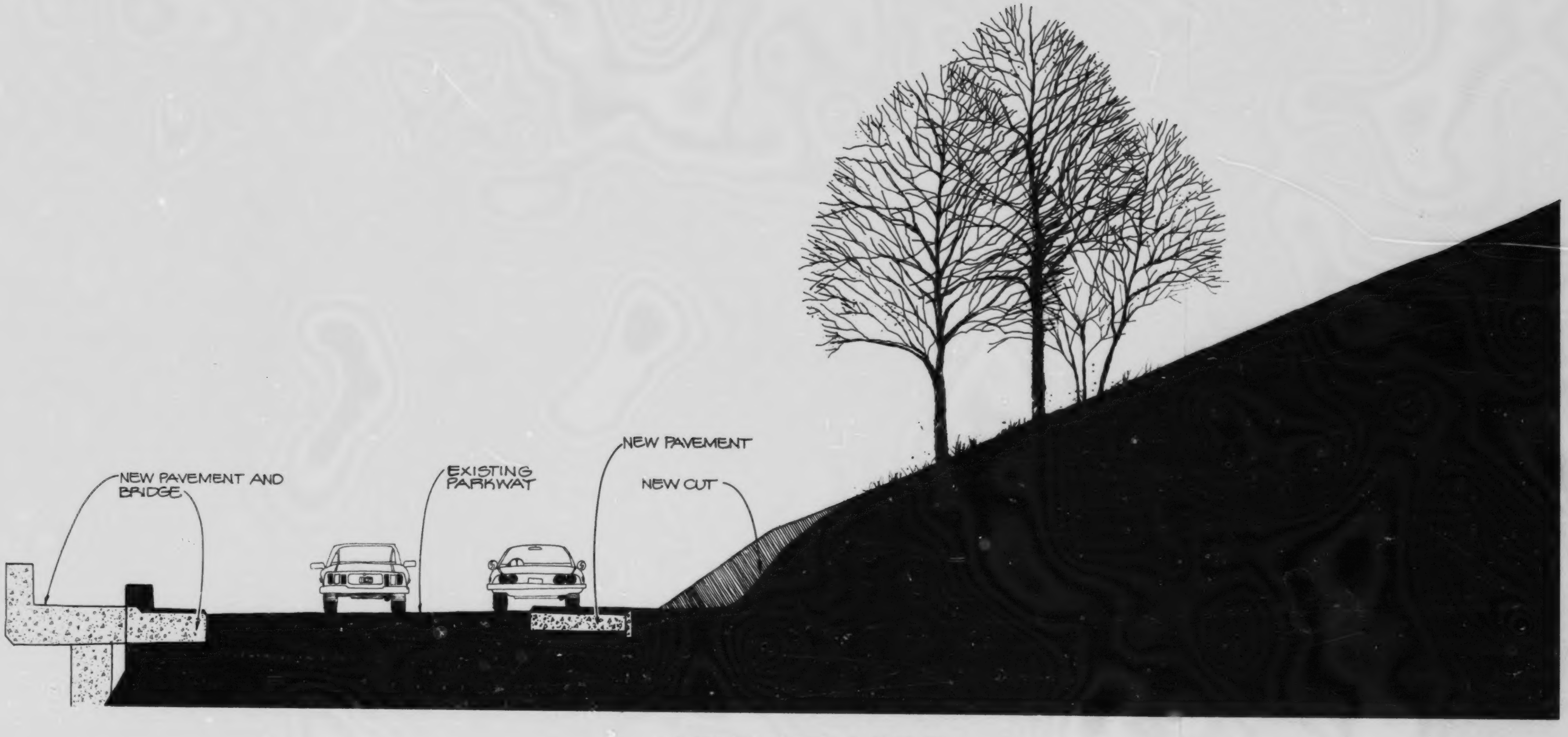

ALTERNATIVES C AND D
INBOUND PARKWAY AT SPOUT RUN MERGE

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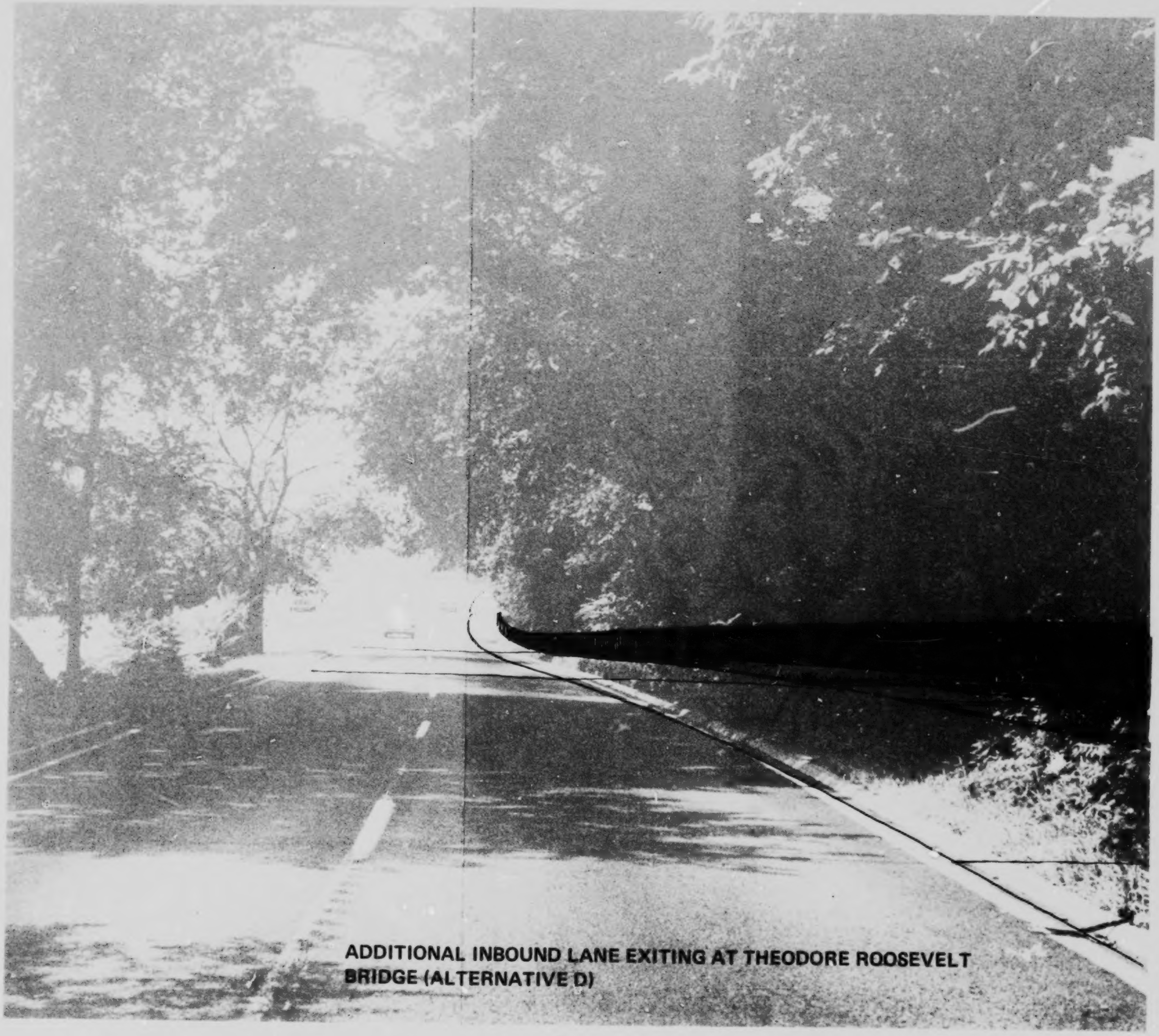
ADDITIO
BRIDGE



ADDITIONAL INBOUND LANE EXITING AT THEODORE ROOSEVELT BRIDGE (ALTERNATIVE D)

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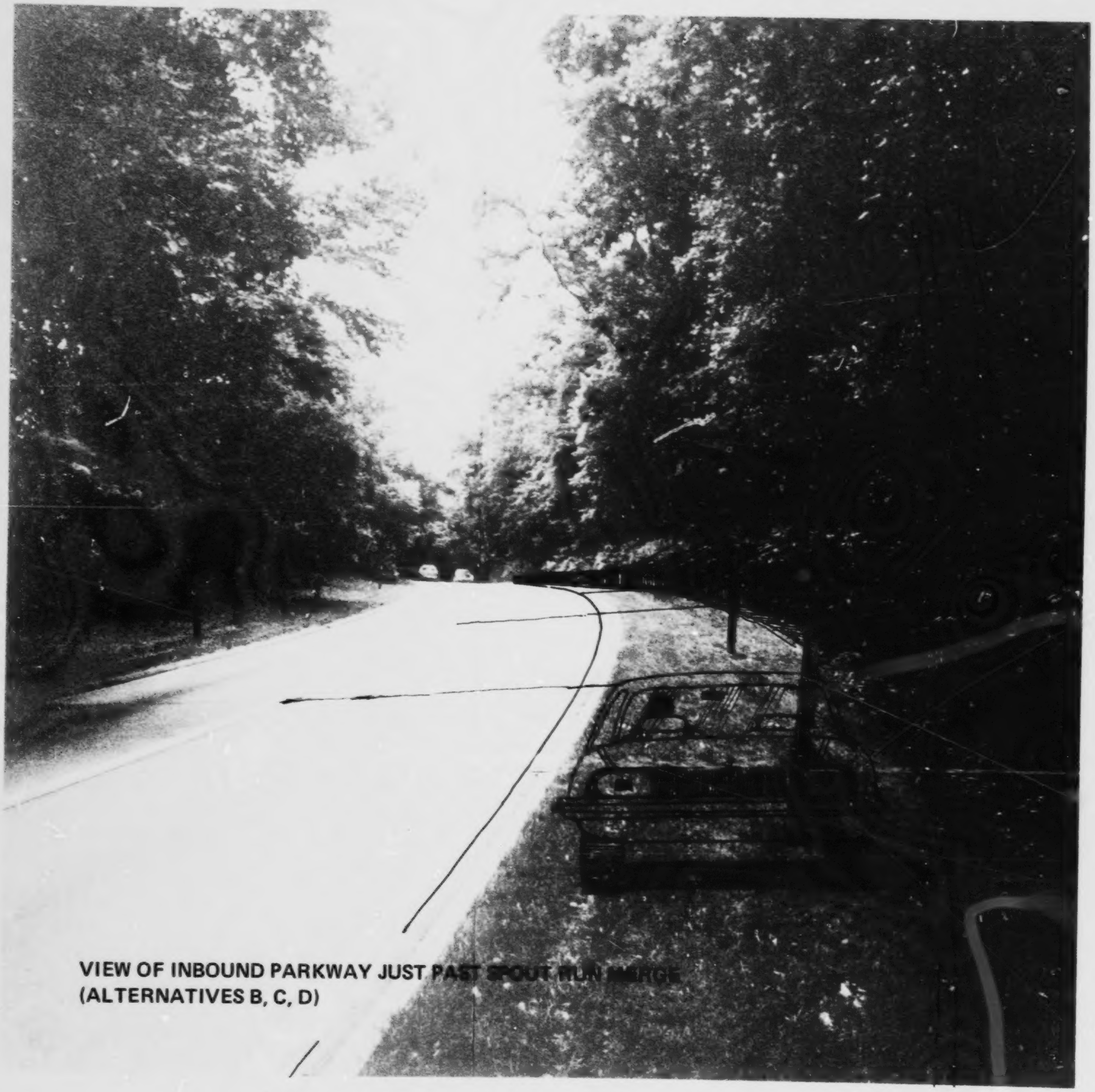
VIEW OF INBOUND PARKWAY JUST
(ALTERNATIVES B, C, D)



VIEW OF INBOUND PARKWAY JUST PAST SPOUT RUN MERGE
(ALTERNATIVES B, C, D)

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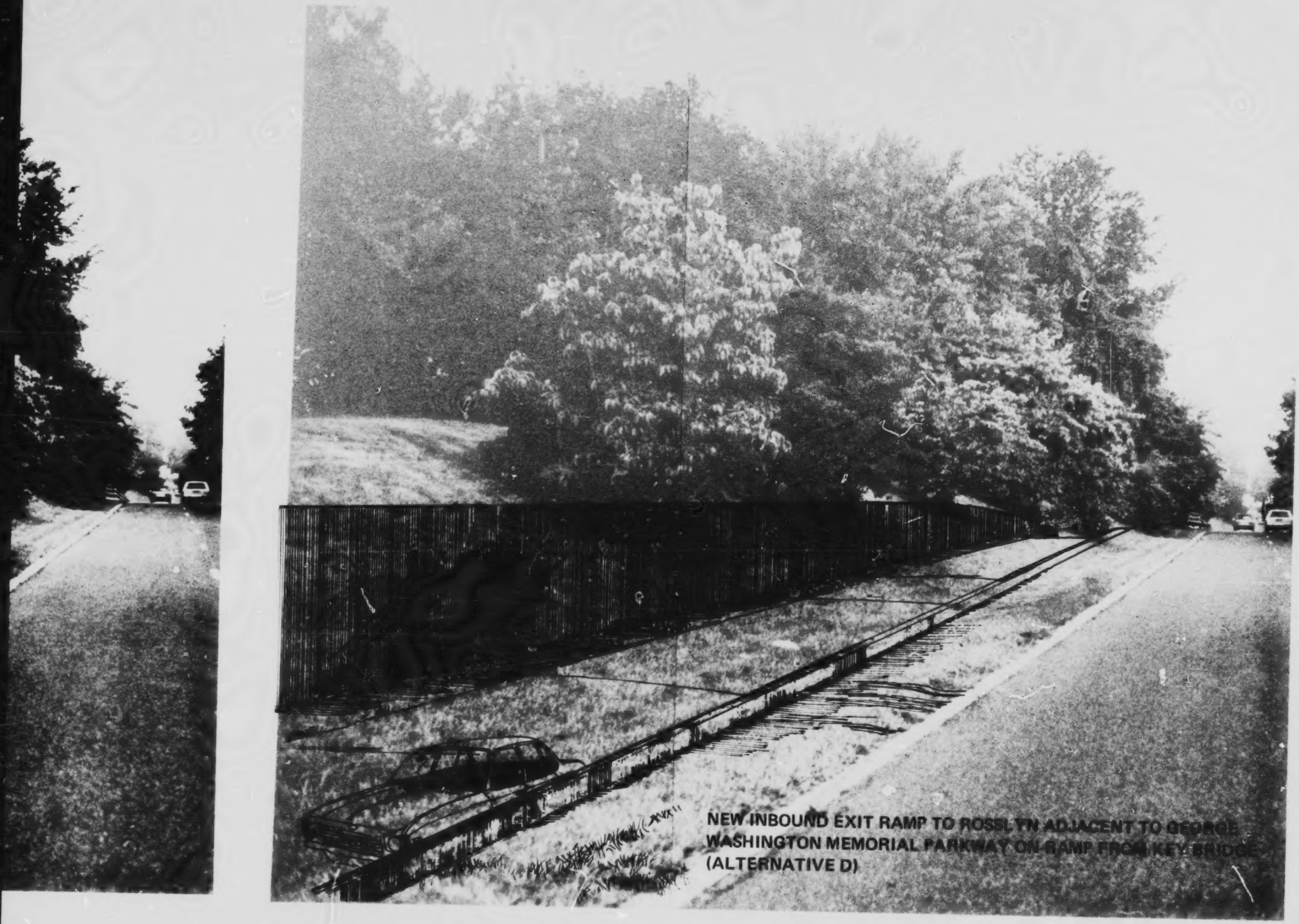

NEW INBOUND EXIT RAMP TO ROSSLYN ADJACENT TO GEORGE WASHINGTON MEMORIAL PARKWAY ON-RAMP FROM KEY BRIDGE (ALTERNATIVE D)

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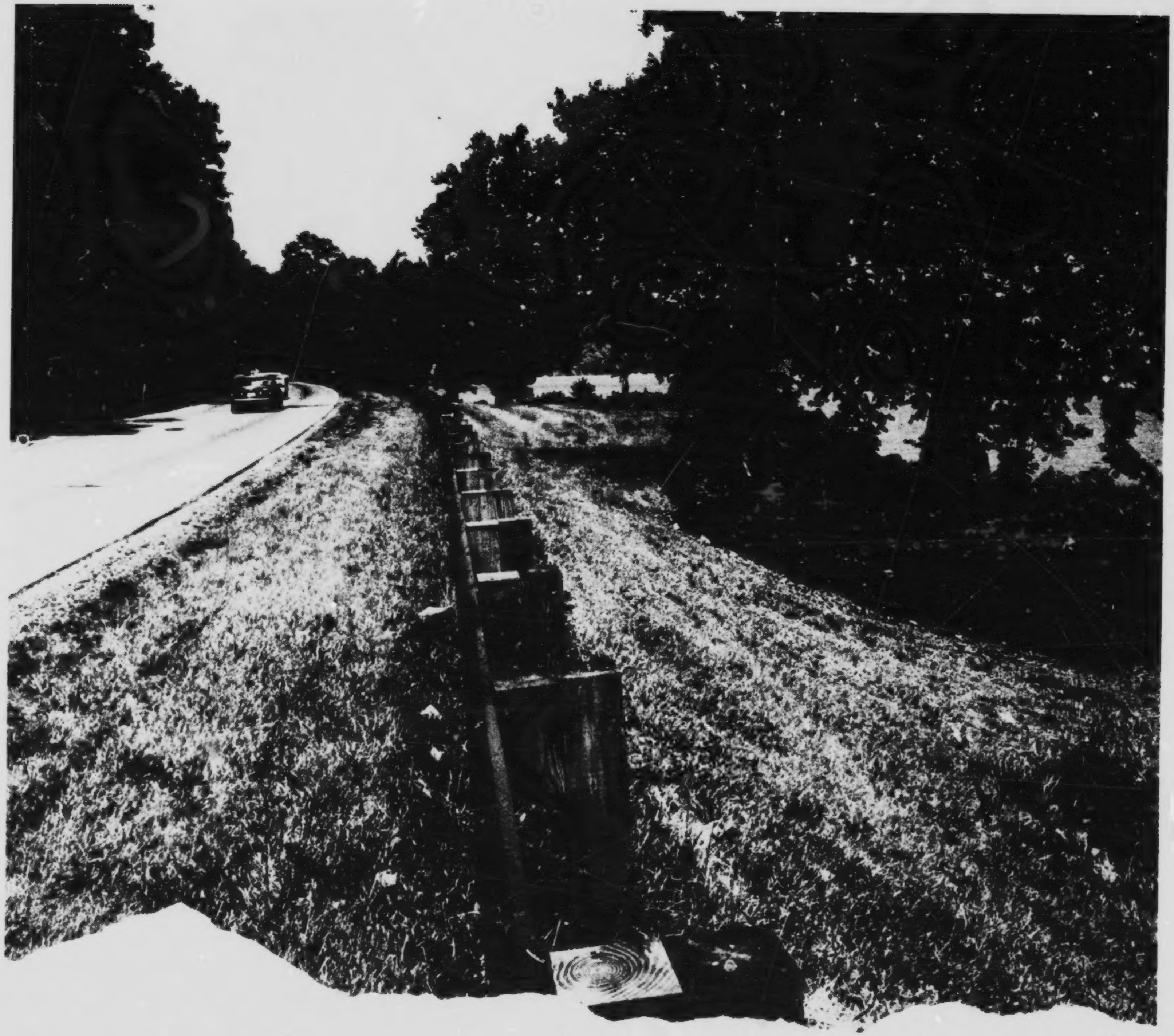
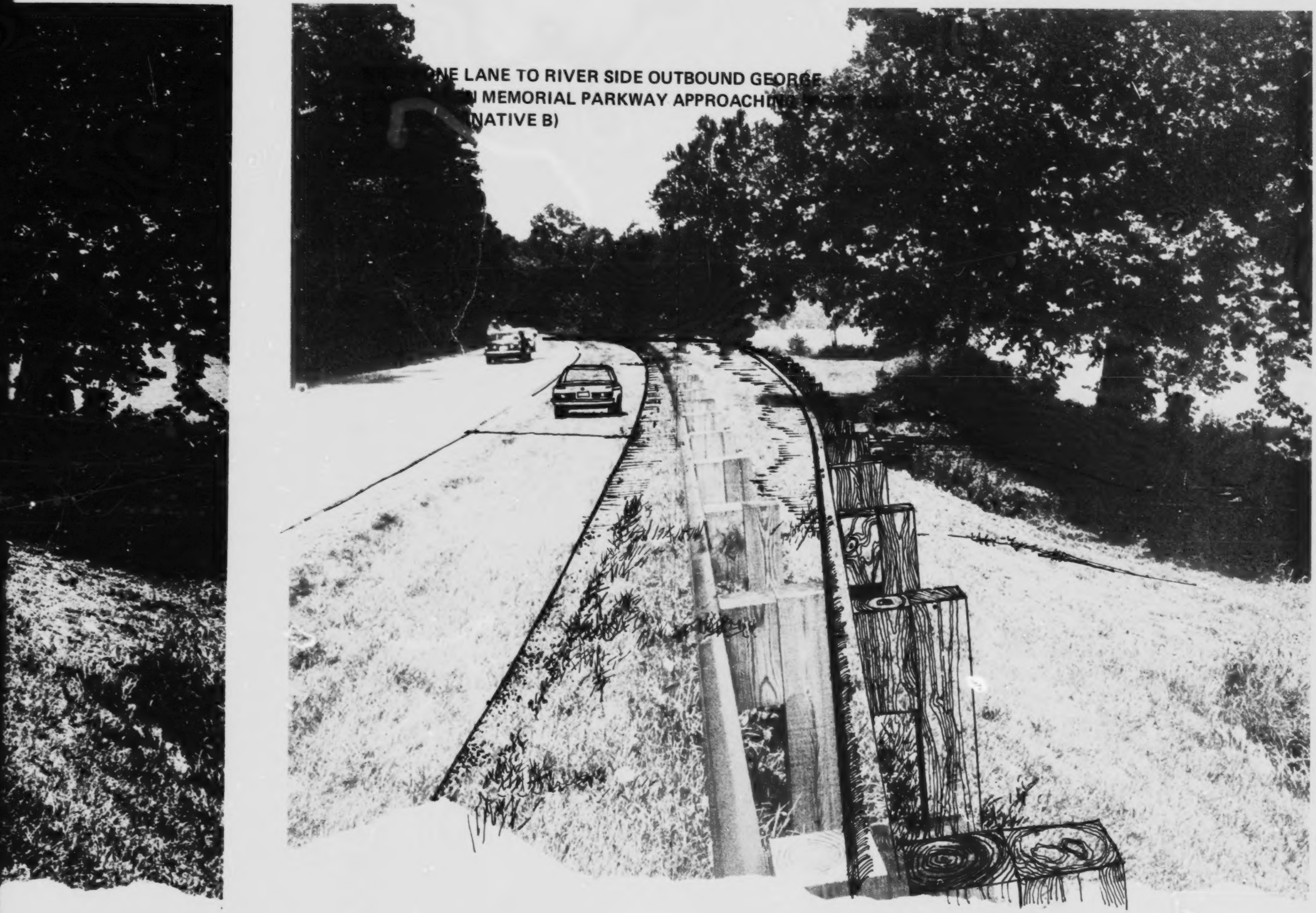


NE LANE TO RIVER SIDE OUT
N MEMORIAL PARKWAY A
NATIVE B)



ONE LANE TO RIVER SIDE OUTBOUND GEORGE
N MEMORIAL PARKWAY APPROACHING
NATIVE B)

84A

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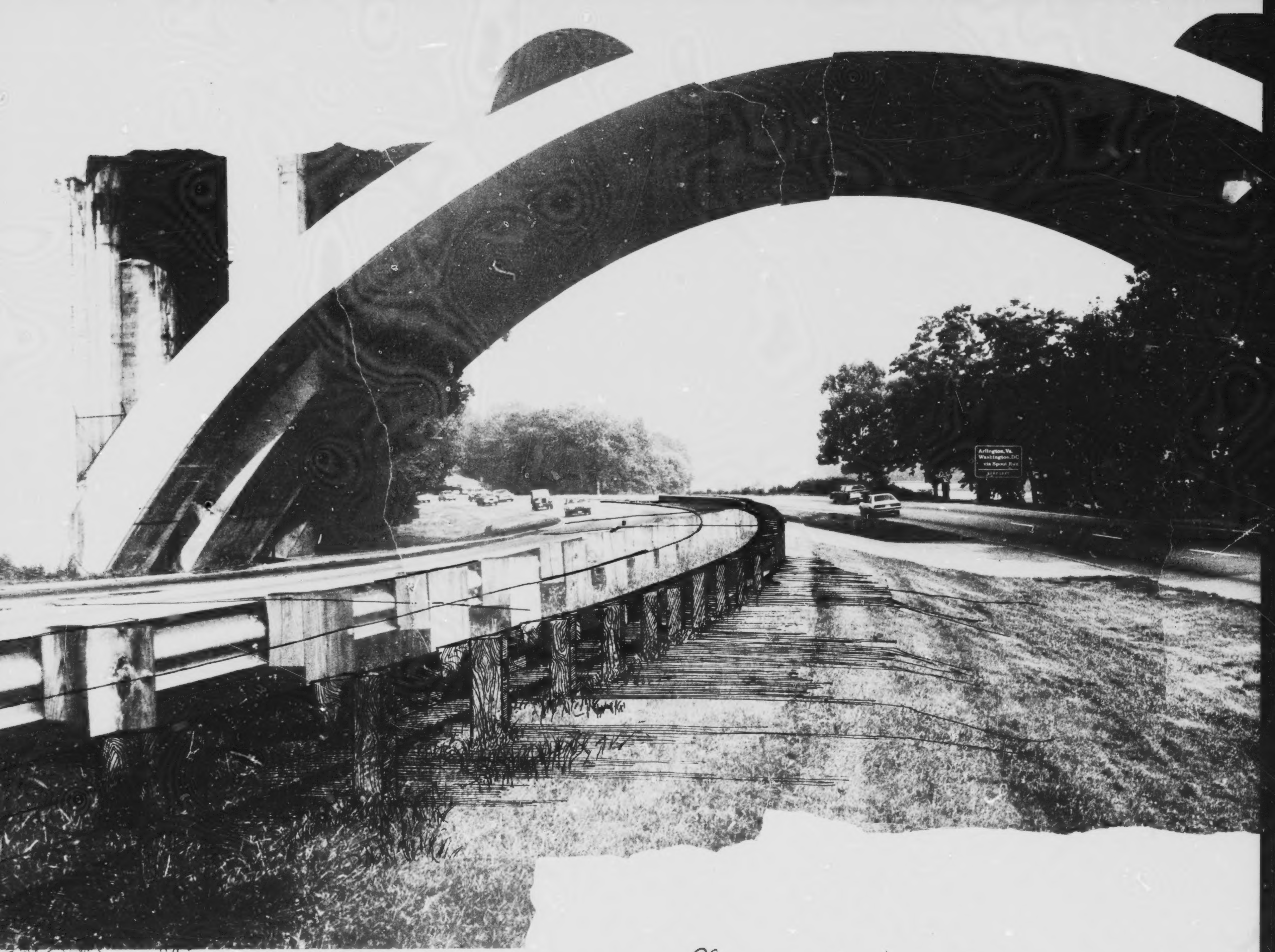
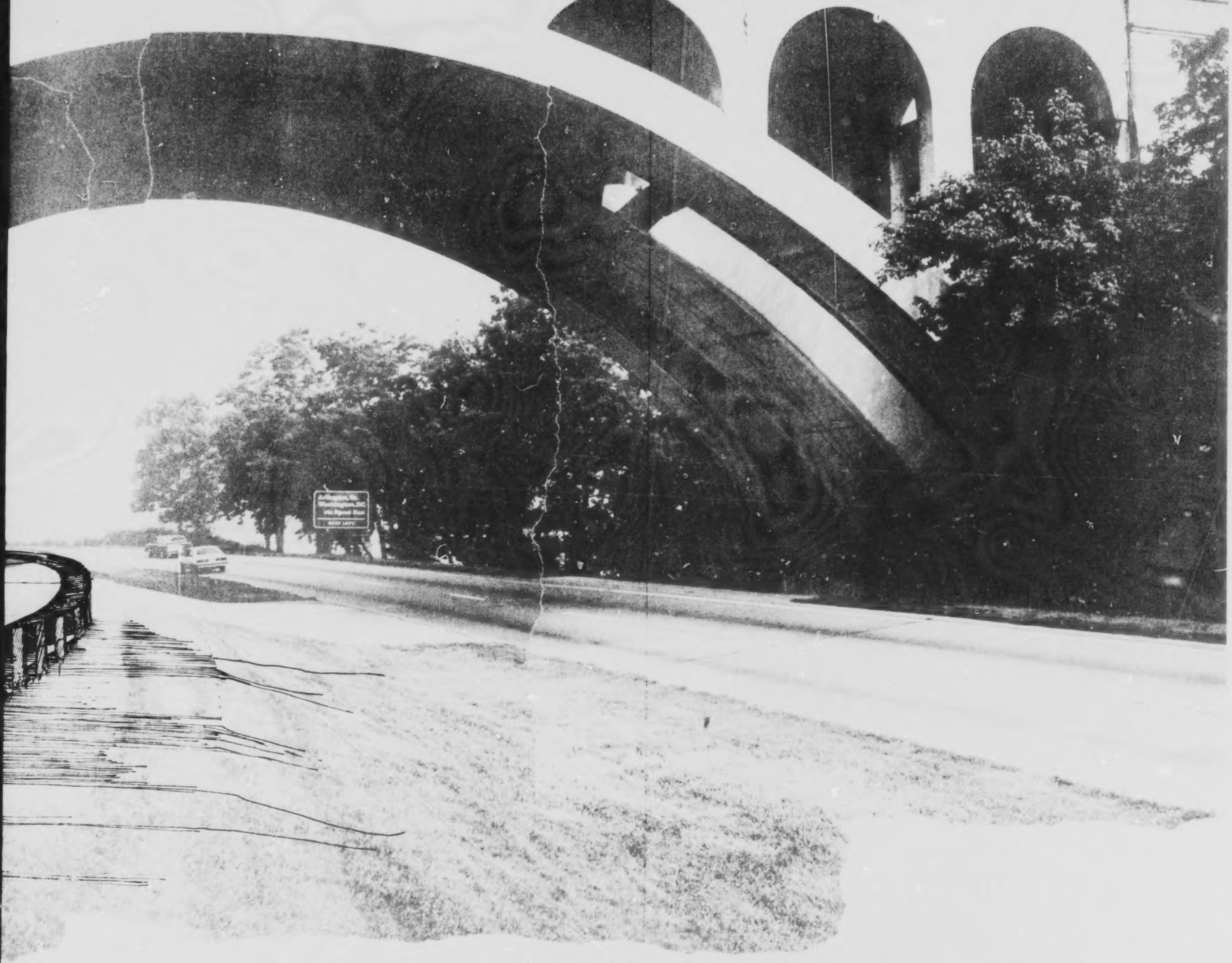

Arlington, Va.
Washington, D.C
via Spout Run
KEEP LEFT



VIEW OUTBOUND UNDER KEY BRIDGE. ONE LANE INBOUND WIDENING AT KEY BRIDGE EXIT TO ROSSLYN AT FAR LEFT. (ALTERNATIVES B, C)

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NATURAL RESOURCES

Alternative A

Resurfacing of the roadway and construction of safety improvements would have little or no effect on soils, vegetation, or water conditions. The projected increases in traffic would increase the amount of petroleum based contaminants that would wash from the roadway surface into wetlands and the Potomac River. Sand and salts used to reduce snowy or icy roadway conditions would also continue to wash into wetlands and the river.

An increase in traffic volumes would have no direct effect on vegetation. The effect on wildlife would be minimal; some increase in road kills of gray squirrels and other small animals would be expected.

Segments of GWMP and the entrances and parking area for Theodore Roosevelt Island are in the 100-year floodplain of the Potomac River, and approximately 3,100 feet of the inbound lanes and 2,200 feet of the outbound lanes of Spout Run Parkway are in the 100-year floodplain of Spout Run. The improvements in the roadway surfaces would have no impacts on floodplains since no roadway geometrics would be changed.

Alternative B

The expansion of the roadway to improve traffic flow and safety would affect 322,000 square feet (7.41 acres) of soil and vegetation, of which less than half (3.66 acres) would be restored to some degree with trees, shrubs, and ground cover. Drainage patterns would be altered, and the increase in an impervious pavement cover would prevent precipitation from soaking into the ground. There would be a proportionate increase in the amount of runoff, which would create erosion problems along drainages and increase the amount of sediment washed into the Potomac River. Erosion and sedimentation would be greatest during construction periods and decrease as vegetation became reestablished on exposed slopes. The projected increases in traffic would increase the petroleum-based contaminants washing into wetlands and the Potomac River. Expansion of the roadway surface would require increased amounts of sand and salts to reduce snowy or icy conditions, and these additional contaminants would also wash into wetlands and the river.

The primary impacts on vegetation would be the permanent removal of 3.74 acres of grass and woodland vegetation and the disturbance of an additional 3.66 acres. Some of this acreage was previously disturbed and landscaped during the original construction of the parkway. Of the acreage affected by the current action, 3.66 acres would be relandscaped and planted to grass and native shrubs and trees. An additional 13,600 square feet (0.31 acre) of existing pavement would be removed and planted to grass or native shrubs and trees.

The numbers of trees that would be removed by specific actions are shown in table 13. The numbers were obtained by actual counts. The road cuts, paved areas, and other features of each alternative were staked on site so that accurate counts and measurements could be taken. A complete assessment of impacts on trees, including a breakdown of tree types, is available at the parkway headquarters at Turkey Run, Virginia. The numbers of trees listed in table 13 represent worst-case analyses of the maximum cuts and fills required to accommodate roadway changes. If retaining walls were more extensively used to decrease cut-and-fill slopes, fewer trees would be affected. However, fill slopes would offer the advantage of allowing for revegetation. During the preliminary design phase, the most appropriate combination of required cut-and-fill slopes and retaining walls would be identified, and impacts would be minimized wherever possible.

The vegetation disturbance caused by construction would interfere with the natural vegetative succession. The forest in this segment of the parkway is currently in transition. The present dominant tree types, including tulip poplar and black locust, are giving way to the more desirable climax vegetation types, represented by the oak, maple, and beech saplings that are now appearing along the forest floor. Any disturbance of these communities would eliminate between 30 and 40 years of natural succession. This impact would be mitigated by using second-succession-phase plant materials and trees in sufficient quantities to properly recover the slopes. Larger trees that were balled in burlap would be used wherever feasible to shorten the time it would take for recovery of mature conditions. Wherever cut slopes were too steep to use larger stock, bare root plantings, or whips, would be used and the recovery time would be longer.

The removal of woodland vegetation would reduce some habitat available to woodland wildlife species. The parkway and adjoining areas of Arlington have limited woodlands, and there would be no place for these animals to relocate. Road kills could increase as a result of greater traffic volumes. The cumulative effect of reduced habitat and increased road kills would reduce the populations of small animals in this section of the parkway.

Approximately 400 feet of the inbound lanes and 1,400 feet of the outbound lanes of GWMP and the entrance and parking area for Theodore Roosevelt Island are in the 100-year floodplain of the Potomac River. The extension of the acceleration lane for outbound traffic from Roosevelt Bridge, the modification of the access and parking area for Theodore Roosevelt Island, and the realignment of the inbound and outbound lanes would occur in the 100-year floodplain. Some increases in grade would be made for these roadway changes. The addition of a third outbound lane between Key Bridge and Spout Run (1,450 feet) would require the construction of retaining walls in the 100-year floodplain. This development would alter the configuration of the floodplain, obstruct the floodway, and displace some floodwaters to other areas of the Potomac River floodplain. The selection of alternative B would require preparation of a statement of finding to document the rationale for the determination

Table 13: Summary of Tree Removals

Alternative B	No.	Total Diameter (inches)
Inbound: Spout Run merge to Key Bridge, right side	417	4,556.0
Inbound: Key Bridge to Roosevelt Bridge, right side	225	1,431.0
Outbound: Theodore Roosevelt Island north area to Spout Run exit	78	1,167.0
Total	720	7,154.0
Alternative C		
Inbound: Spout Run merge to Key Bridge, left side	116	1,368.0
Inbound: Spout Run merge to Key Bridge, right side	194	2,013.0
Inbound: Key Bridge to Roosevelt Bridge, right side	77	1,008.0
Outbound: Theodore Roosevelt Island north area to Spout Run exit	109	1,842.5
Total	496	6,231.5
Alernative D		
Inbound: Spout Run merge to Key Bridge, left side	116	1,368.0
Inbound: Spout Run merge to Key Bridge, right side	194	2,013.0
Inbound: Ramp to Rosslyn Circle along Marriot tract	239	2,558.5
Inbound: Key Bridge to Roosevelt Bridge, right side	221	2,605.0
Outbound: Theodore Roosevelt Island north area to Spout Run exit	270	4,185.0
Total	1,040	12,729.5

that there is no practicable alternative to expanding the roadway in the floodplain. During any flooding conditions on the parkway, the U.S. Park Police would reroute traffic as necessary. No critical actions would occur in the 500-year floodplain. The construction of a third outbound lane along the piedmont rock cliff would force the development of the Potomac River Trail onto the river edge, which would have an indirect effect on wetlands of the river.

Alternative C

The addition of inbound and outbound lanes to improve traffic flow and safety would affect 411,000 square feet (9.44 acres) of soil and vegetation, of which more than half (5.25 acres) would be restored to some degree with trees, shrubs, and ground cover. Drainage patterns would be altered, and the increase in an impervious pavement cover would prevent precipitation from soaking into the ground. There would be a proportionate increase in the amount of runoff, which would create erosion problems along drainages and increase the amount of sediment washed into the Potomac River. Erosion and sedimentation would be greatest during construction periods and decrease as vegetation became reestablished on exposed slopes. The projected increases in traffic would increase the petroleum-based contaminants washing into wetlands and the Potomac River. Expansion of the roadway surface would require increased amounts of sand and salts to reduce snowy or icy conditions, and these additional contaminants would also wash into wetlands and the river.

The primary impacts on vegetation in this section of the parkway would be the permanent removal of 4.19 acres of grass and woodland vegetation and the disturbance of an additional 5.25 acres. Some of this acreage was previously disturbed and landscaped. Of the acreage affected by the current action, 5.25 acres would be relandscaped and planted to grass and native shrubs and trees. An additional 20,800 square feet (0.48 acre) of existing pavement would be removed and planted to grass or native shrubs and trees. The numbers of trees that would be removed are shown in table 13. As described for alternative B, the impacts on vegetation would include a 30- to 40-year setback in natural succession on disturbed sites that would be revegetated.

The removal of woodland vegetation would reduce some habitat available to woodland wildlife species. The parkway and adjoining areas of Arlington have limited woodlands, and there would be no place for these animals to relocate. Road kills could increase as a result of greater traffic volumes. The cumulative effect of reduced habitat and increased road kills would reduce the animal populations in this section of the parkway.

Approximately 400 feet of the inbound lanes and 1,400 feet of the outbound lanes of GWMP and the entrance and parking area for Theodore Roosevelt Island are in the 100-year floodplain of the Potomac River. The extension of the acceleration lane for outbound traffic from Roosevelt Bridge, the modification of the access and parking area for Theodore

Roosevelt Island, and the realignment of the inbound and outbound lanes would occur in the 100-year floodplain. Some increases in grade would be made for these roadway changes. The addition of third and fourth outbound lanes between Key Bridge and Spout Run (1,450 feet) would require the construction of retaining walls in the 100-year floodplain. This development would alter the configuration of the floodplain, obstruct the floodway, and displace floodwaters to other areas of the Potomac River floodplain. The selection of alternative C would require preparation of a statement of finding to document the rationale for the determination that there is no practicable alternative to expanding the roadway in the floodplain. During any flooding conditions on the parkway, the U.S. Park Police would reroute traffic as necessary. No critical actions would occur in the 500-year floodplain. The construction of two additional lanes for outbound traffic along the piedmont rock cliff would force the development of the Potomac River Trail farther onto the river edge, which would have an indirect effect on wetlands of the river.

Alternative D

The addition of inbound and outbound traffic lanes and ramp changes to improve traffic flow and safety would affect 624,000 square feet (14.33 acres) of soil and vegetation, of which approximately two thirds (9.40 acres) would be restored to some degree with trees, shrubs, and ground cover. Drainage patterns would be altered, and the increase in an impervious pavement cover would prevent precipitation from soaking into the ground. There would be a proportionate increase in the amount of runoff, which would create erosion problems along drainages and increase the amount of sediment washed into the Potomac River. Erosion and sedimentation would be greatest during construction periods and decrease as vegetation became reestablished on exposed slopes. The projected increases in traffic would increase the petroleum-based contaminants washing into wetlands and the Potomac River. Expansion of the roadway surface would require increased amounts of sand and salts to reduce snowy or icy road conditions, and these additional contaminants would also wash into wetlands and the river.

The primary impacts on vegetation would be the permanent removal of 4.93 acres of grass and woodland vegetation and the disturbance of an additional 9.40 acres. Some of this acreage was previously disturbed and landscaped. Of the acreage disturbed by the current action, 9.40 acres would be relandscaped and planted to grass and native shrubs and trees. An additional 13,600 square feet (0.31 acre) of existing pavement would be removed and planted to grass or native shrubs and trees. The numbers of trees that would be removed are shown in table 13. As described for alternative B, impacts on vegetation would include a 30- to 40-year setback in natural succession for disturbed sites that would be revegetated.

The removal of woodland vegetation would reduce some habitat available to woodland wildlife species. The parkway and adjoining areas of Arlington have limited woodlands, and there would be no place for these animals to relocate. Road kills could increase as a result of greater traffic volumes. The cumulative effect of reduced habitat and increased road kills would reduce the animal populations in this section of the parkway.

Approximately 400 feet of the inbound lanes and 1,400 feet of the outbound lanes of GWMP and the entrance and parking area for Theodore Roosevelt Island are in the 100-year floodplain of the Potomac River. The extension of the acceleration lane for outbound traffic from Roosevelt Bridge, the modification of the access and parking area for Theodore Roosevelt Island, and the realignment of the inbound and outbound lanes would occur in the 100-year floodplain. Some increases in grade would be made for these roadway changes. The addition of third and fourth outbound lanes between Roosevelt Bridge and Spout Run would require construction of retaining walls in the 100-year floodplain. This development would alter the configuration of the floodplain, obstruct the floodway, and displace floodwaters to other areas of the Potomac River floodplain. The selection of alternative D would require preparation of a statement of finding to document the rationale for the determination that there is no practicable alternative to expanding the roadway in the floodplain. During any flooding conditions on the parkway, the U.S. Park Police would reroute traffic as necessary. No critical actions would occur in the 500-year floodplain. The construction of two additional lanes for outbound traffic along the piedmont rock cliff would force the development of the Potomac River Trail onto the river edge, which would have an indirect effect on wetlands of the river.

The expansion of the roadway to four lanes between Key Bridge and the Spout Run exit could require a permit from the U.S. Army Corps of Engineers for development of a retaining wall and fill along the Potomac River.

AIR QUALITY

The CALINE 3 model was used to predict carbon monoxide levels for four sites where people might be present for long periods. The predicted one-hour (morning and evening peak hour) concentrations of carbon monoxide are listed in table 14, and the predicted eight-hour concentrations are listed in table 15. No instances of violations of the national ambient air quality standards for carbon monoxide would be expected. Alternative A would result in the most adverse impact because of the more congested road conditions and slower speeds. Impacts would be greatest during the evening peak period at all four receptor sites. The Theodore Roosevelt Island parking lot would receive the highest carbon monoxide concentrations in both 1990 and 2000. Alternatives B, C, and D would not vary greatly in the general levels of concentration; however, some localized differences would occur. For example, elevated concentrations in the vicnity of the Marriott Hotel would occur under alternative D as a result of the additional off-ramp leading from inbound GWMP to Rosslyn Circle.

Table 14: Predicted Carbon Monoxide One-Hour Concentrations, 1990 and 2000

	Alternative				Alternative			
	A	B	C	D	A	B	C	D
Receptor Site	1990 Morning Peak Hour (ppm)				1990 Evening Peak Hour (ppm)			
Lorcom Lane and Spout Run	3.0	2.9	2.8	2.7	5.9	2.9	3.0	3.0
Lee Highway and Adams Street	3.3	3.1	2.8	2.8	4.9	3.1	3.0	3.0
Marriott Hotel	3.3	3.2	3.1	3.5	5.7	3.3	3.4	3.5
Theodore Roosevelt Island parking lot	3.8	3.6	3.7	3.8	10.3	4.3	4.2	4.0
	2000 Morning Peak Hour (ppm)				2000 Evening Peak Hour (ppm)			
Lorcom Lane and Spout Run	2.5	2.4	2.5	2.3	4.6	2.7	2.7	2.7
Lee Highway and Adams Street	2.6	2.6	2.4	2.4	3.8	2.7	2.7	2.8
Marriott Hotel	2.8	2.7	2.8	3.0	4.3	2.8	2.8	3.0
Theodore Roosevelt Island parking lot	3.1	3.1	3.4	3.4	7.6	3.5	3.5	3.4

Source: Belomo-McGee 1984.

Note: The carbon monoxide standard for one hour is 35.0 ppm.

Table 15: Predicted Carbon Monoxide Eight-Hour Concentrations, 1990 and 2000

Receptor Site	Alternative A	Alternative B	Alternative C	Alternative D
	1990 (ppm)			
Lorcom Lane and Spout Run	4.1	2.0	2.1	2.1
Lee Highway and Adams Street	3.7	2.4	2.2	2.2
Marriott Hotel	4.0	2.3	2.4	2.4
Theodore Roosevelt Island parking lot	7.2	3.0	2.9	2.8
	2000 (ppm)			
Lorcom Lane and Spout Run	3.2	1.7	1.9	1.9
Lee Highway and Adams Street	2.9	2.1	2.1	2.2
Marriott Hotel	3.0	1.9	1.9	2.1
Theodore Roosevelt Island parking lot	5.3	2.4	2.4	2.4

Source: Bellomo-McGee 1984.

Note: The carbon monoxide eight-hour standard is 9.0 ppm.

The predicted hydrocarbon emission burdens that would occur under the various alternatives are compared in table 16. There would be little difference among the alternatives with regard to the hydrocarbon regional burden.

Some short-term adverse air quality effects would result from construction activities. The alternatives calling for major new construction or reconstruction--alternatives C and D--would potentially have the most detrimental impacts. Adverse effects on air quality would result from delays on the road system; from fugitive dust caused by grading, earth moving, and demolition activities; and from additional trips generated by construction vehicles. None of these sources would have long-term or irreversible effects on air quality, and the impacts could be mitigated using effective work zone traffic control measures and standard procedures for watering and other methods of dust control.

Table 16: Hydrocarbon Burden Analysis, 1990 and 2000

Regional Peak Hour Hydrocarbon Emissions
(100 lb/hour)

	1990		2000	
Alternative	Morning	Evening	Morning	Evening
A	17.6	15.7	10.4	9.3
B	17.6	15.7	10.4	9.3
C	17.6	15.7	10.4	9.3
D	17.6	15.7	10.4	9.3

Source: Bellomo-McGee 1984.

Note: Predictions of peak-hour emissions are based on morning and evening peak-hour vehicle miles of travel and average speed.

In summary, none of the alternatives would adversely affect air quality in the metropolitan Washington area, with the possible exception of some short-term carbon monoxide effects during construction. The national ambient air quality standards for carbon monoxide are not currently being violated in the northern Virginia portion of the region, and none of the GWMP alternatives would result in violations of the standards in the future. The regional ozone standard is expected to be attained by 1987 with the implementation of federal controls on motor vehicles and the inspection and maintenance programs being implemented in Virginia, the District of Columbia, and Maryland, together with the program for stationary source controls in these areas.

Regional proposals for attaining conformance with the national ambient air quality standards are outlined in a "Final Washington Metropolitan Air Quality Plan for Control of Ozone and Carbon Monoxide" (MWCOG 1982). This is a required state implementation plan and it has been approved by the Environmental Protection Agency. The FHWA has determined that both the transportation plan and the transportation improvement plan conform with the state implementation plan. FHWA has also determined that this project is included in the transportation improvement program for the metropolitan Washington region. Therefore, pursuant to 23 CFR 770, this project conforms to the state implementation plan.

NOISE

The FHWA traffic noise prediction model was used to predict the traffic-generated noise levels for four sites where people might be present for long periods. The results of this analysis, shown in table 17, indicate that future noise levels would be slightly higher than existing levels as a direct result of increased traffic volumes and speeds. The predicted traffic-generated noise levels do not include ambient sound generated from other sources, most prominently the jet aircraft using National Airport, which would undoubtedly continue to dominate noise levels in the GWMP study area.

Traffic-generated noise would differ slightly among the alternatives. The predicted noise levels would be within the FHWA design noise level with the exception of one reading for the Theodore Roosevelt Island parking lot. This site would receive the highest noise impacts under all of the alternatives because of its proximity to the roadway and the unbuffered conditions. The FHWA design level for this land use (67 L_{eq}) would be slightly exceeded at this site in the evening peak hour by the year 2000 as a result of additional traffic on the added outbound lane proposed in alternative D. It might be desirable to construct a landscape berm as a sound attenuation barrier in the Theodore Roosevelt Island parking lot. This could enhance the park experience for visitors and the visual experience for parkway users.

The residential area on Lee Highway at Adams Street would receive greater impacts than the Lorcom Lane residential area because it is closer to the roadway. The Marriott Hotel receptor site would generally receive the least impact because of its distance from the roadway.

CULTURAL RESOURCES

The historic character of the parkway would be affected by changes in the roadway alignment. The impact is addressed under "Visual Quality." No other historic resources would be adversely affected under any of the alternatives. Construction activities under alternatives B, C, and D would require archeological surveying and testing. The potential for disturbance of archeological resources would be minimal in alternative B, moderate in alternative C, and high in alternative D.

If any unanticipated archeological remains were discovered during the construction phases of this project, construction would halt and the regional archeologist of the National Capital Region would be notified immediately in order to make an on-site determination of the nature and significance of the archeological remains.

Table 17: Predicted Traffic Noise Impacts, 1990 and 2000

Receptor Site	Alternative				Alternative			
	A	B	C	D	A	B	C	D
	1990 Morning Peak-Hour ($L_{eq}(h)$)				1990 Evening Peak-Hour ($L_{eq}(h)$)			
Lorcom Lane and Spout Run	53.0	53.4	56.4	55.5	58.2	58.1	58.3	58.1
Lee Highway and Adams Street	65.3	65.2	64.8	64.8	66.2	66.2	66.3	66.2
Marriott Hotel	53.8	55.6	55.3	53.9	54.0	57.8	57.8	56.7
Theodore Roosevelt Island parking lot	63.3	64.3	64.5	65.0	62.4	64.7	64.9	67.0
	2000 Morning Peak-Hour ($L_{eq}(h)$)				2000 Evening Peak-Hour ($L_{eq}(h)$)			
Lorcom Lane and Spout Run	56.6	56.9	58.9	58.2	59.3	59.3	60.5	60.8
Lee Highway and Adams Street	65.9	65.8	64.8	64.8	66.9	66.9	66.9	66.9
Marriott Hotel	54.7	57.1	51.6	60.6	54.4	55.8	55.8	58.5
Theodore Roosevelt Island parking lot	63.8	64.8	65.0	65.2	63.0	65.6	65.9	67.9

Source: Bellomo-McGee 1984.

Note: The FHWA design noise level for the affected land uses is 67.0 L_{eq}.

RECREATION

Alternative A

An improved road surface would add to the pleasure of driving the parkway and, in that respect, increase its recreational value. Otherwise, this alternative would have no significant effect on recreation within the study area.

Alternative B

The reconstruction of Rosslyn Circle and the GWMP off-ramp to the circle and Key Bridge would improve traffic flow and create safer and less confusing crossings for pedestrians and bicyclists. The installation of a traffic signal at the intersection of the GWMP off-ramp and Lee Highway would regulate bicycle traffic on the bicycle path and would ensure safe crossings for motorists and bicyclists.

Improvements to the Theodore Roosevelt Island parking area, such as acceleration/deceleration lanes, new entrance, redesigned lot, and landscaping, would make that site a more attractive and safer area for visitors, and it might increase the recreational use of the site by 10 percent or more. Further increases in recreational use would be expected to accompany additional planned improvements, such as extending the Mount Vernon Trail, building a bicycle/pedestrian bridge to Rosslyn, and providing restrooms, trash cans, and picnic tables. When all of this other development is completed, recreational use is expected to increase by 100 to 200 percent.

Adding a continuous lane on outbound GWMP between the on-ramp from Key Bridge/Rosslyn and the Spout Run exit would require paving part of the narrow strip of land between the roadway and the river. This would encroach on the Potomac River Trail and bring traffic closer to hikers. Because of the narrowness of this section, the natural character of the trail is already compromised, and this action would only add further to the intrusive visibility, noise, and hazard of traffic.

Alternative C

A fourth outbound lane between the Key Bridge on-ramp and the Spout Run exit would encroach even closer than alternative C on the existing hiking trail. To accomplish the road widening in the narrowest sections, retaining walls and landfill would be required, and the hiking trail would be routed onto boardwalks at the base of the wall. Other impacts of this alternative would be the same as described for alternative B.

Alternative D

The addition of a third continuous lane between Roosevelt and Key Bridges would confine the Little River shoreline recreational activity to a narrower area. Other impacts of this alternative would be the same as those described for alternatives B and C.

TRAFFIC IMPACTS

INTRODUCTION

The impact analysis involved the use of Metropolitan Washington Council of Governments travel data, socioeconomic data, and computer coded networks to measure the effects of each of the alternatives on the entire metropolitan highway and transit network. The methodology used for this analysis is described in appendix B. The analysis looked at both the short-term (1990) and the long-term (2000) impacts of the alternatives under study.

Because the analysis dealt with conditions in future years, it was necessary to make some assumptions about those conditions in terms both of physical growth and development and of policy changes. The following assumptions, defined by the Metropolitan Washington Council of Governments, were used in forecasting traffic volumes for GWMP and Spout Run Parkway for the years 1990 and 2000:

Highways

The Springfield Bypass would be constructed from state route VA 7 to US 1.

The intercounty connector would be constructed from the Baltimore-Washington Parkway to MD 28 (Darnestown Road).

I-370 would be constructed from Great Seneca Highway to the Shady Grove Metro station.

The Dulles Toll Road (parallel to the Dulles access road) would be constructed from VA 28 to the Capital Beltway (I-495).*

Great Seneca Highway would be constructed from Middlebrook Road to MD 28 (Darnestown Road) in Montgomery County.

MD 228 would be constructed from Indian Head Highway (MD 210) to the Charles County line in Prince Georges County.

I-495 (Capital Beltway) would be widened to eight lanes from GWMP to the Cabin John Bridge in Virginia.

High-occupancy-vehicle restrictions would be enforced on I-66 and I-395 (Shirley Highway) for reserved lanes during rush hours.

Transit

The 101-mile regional Metrorail system would be complete.

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*This road was opened in January 1985.

OVERVIEW

Most locations within the study area are capacity deficient now, and there would be little change in this situation as a result of implementing any of the alternatives (table 18). (A location would be considered capacity deficient if the level of service was E or F; locations providing levels of service A through D would not be considered capacity deficient.) Most locations would remain capacity deficient when roadway improvements were made because additional traffic would be attracted to the improved roadway until the greater capacity was reached and congestion again resulted in a low level of service.

Table 18: Summary of Capacity-Deficient Locations, 2000

Route Segment	Existing Conditions	Alternatives A	B	C	D
Inbound/Morning Peak Hour					
Junction of Spout Run Parkway and GWMP	X	X	X		X
GWMP off-ramp to Key Bridge/Rosslyn	--*	--*	--*	X	X
Junction of GWMP off-ramp to Key Bridge/Rosslyn and Lynn Street	--*	--*	--*	X	X
Junction of GWMP off-ramp to Roosevelt Bridge and inbound I-66	X	X	X	X	X
Outbound/Evening Peak Hour					
GWMP on-ramp from Roosevelt Bridge	X	X	X	X	X
Junction of on-ramp from Roosevelt Bridge and GWMP	X	X	X	X	X
GWMP between Key Bridge and Spout Run	X	X	X		
GWMP on-ramp from Key Bridge/Rosslyn		X	X	X	X

Note: X = location where the level of service would be E or F or where the assignment would exceed the theoretical capacity.

*Ramp closed to traffic from 7:00 to 9:00 a.m.

While future changes in accident frequency or severity could not be specifically quantified, it was assumed that improvements in level of service would reduce stop-and-go traffic conditions and decrease the number of rear-end collisions.

The remainder of this section surveys how traffic flow, travel characteristics, and safety conditions would change at various locations as a result of the actions under consideration. This overview is based on more detailed analyses of traffic flow, travel characteristics, level of service, and accidents, which are presented in subsequent sections of this report.

Reconstruction and signalization of the Lorcom Lane/Spout Run intersection (proposed as part of alternatives C and D) would eliminate the need to close outbound Spout Run beyond Lorcom Lane during the morning peak period and would create safer conditions for vehicles turning left from Lorcom Lane onto Spout Run Parkway and for vehicles turning from the inbound to the outbound roadway at the Spout Run turnaround.

The reconstruction of the Spout Run/GWMP merge area to provide two lanes for inbound GWMP traffic and a long acceleration lane for traffic merging onto GWMP from Spout Run (alternative B) would improve traffic flow on inbound GWMP during the morning peak period. Traffic queues would not occur during normal operating conditions on GWMP north of the Spout Run Parkway. Eliminating stop-and-go traffic on this roadway section should reduce the number of rear-end accidents. However, this configuration still would not be able to process the projected traffic at an acceptable level of service (D) by the year 2000. Traffic on Spout Run Parkway would still have to merge onto GWMP. Traffic queues on Spout Run would increase from 0.5 mile at present to 1.1 miles under alternative B, and there would be additional stop-and-go traffic on that parkway. (Queue length in this discussion is based on a vehicle density of 100 vehicles per mile per lane. The queues described would be those expected under normal operating conditions; abnormal conditions caused by accidents, construction work, or any other event that disrupts traffic flow would result in different queue configurations.)

The construction of an additional third lane on GWMP to serve merging traffic from inbound Spout Run Parkway (alternatives C and D) would likely result in a significant increase in inbound traffic during the morning peak period on Spout Run Parkway. Level of service D would be obtained only in alternative C. Traffic queues would not be expected to occur in alternatives C or D.

Construction of a new off-ramp to Fort Myer Drive (alternative D) would improve access from GWMP to Rosslyn, especially during the morning peak period. Drivers on GWMP would no longer have to cross North Lynn Street, at what is now a frequent accident intersection, to go to Rosslyn. If implemented with the construction of a new third inbound lane and if opened during the morning peak period, this new off-ramp would result in significant increases in traffic volumes on GWMP and would allow a significant amount of additional traffic to enter the Rosslyn Circle area. The level of service would not be improved over existing conditions between Spout Run and the off-ramp to Key Bridge. In alternatives B and D the level of service would be expected to be D. There could be some reduction in the number of rear-end accidents in alternatives B, C, and D.

Opening the off-ramp to Key Bridge during the morning peak period (alternatives C and D) would generate additional traffic demand to use Key Bridge. Additional traffic would result in additional congestion and accidents at the divergence area on inbound GWMP. Queues of 2.75 miles would be expected under alternative C, and queues of 2.0 miles under alternative D, at the Key Bridge off-ramp. Travel times would be shorter with alternative D than with C for traffic approaching the Key Bridge off-ramp from GWMP. (Travel time in this discussion includes both running and delay time.)

Reconstruction of the off-ramp to Key Bridge/Rosslyn (alternatives B, C, and D) would result in higher levels of service except during the morning peak hours. During the morning peak hours, the projected level of service would be F for alternatives C and D.

The poor level of service at the intersection of North Lynn Street and the off-ramp from GWMP would be improved by any action that would effectively prohibit vehicles on the ramp from crossing the intersection without a traffic signal. This could be accomplished by reconstructing the GWMP off-ramp to provide access only to inbound Key Bridge, while providing access to Rosslyn some other way (alternatives C and D). Alternatively, it could be accomplished by reconstructing the off-ramp so it merges with the I-66 off-ramp, thus providing access to Rosslyn through the existing signalized intersection at North Lynn Street (alternative B). Reconstruction of the roadway providing access from North Lynn Street to the GWMP on-ramp (alternatives B, C, and D) would provide more storage space for vehicles desiring to enter GWMP from Rosslyn. Key Bridge would be expected to have a morning peak-hour capacity deficiency in all of the alternatives.

Construction of a new third inbound lane between Key and Roosevelt bridges (alternatives C and D) would provide additional capacity. However, this capacity would be underutilized if the ramp to Key Bridge was opened during the morning peak period, because congestion near the Key Bridge exit would impede through-traffic.

Construction of a longer deceleration lane for the off-ramp to Roosevelt Bridge (alternative B) might improve traffic flow on GWMP. However, the traffic projections indicate that traffic would still queue on the off-ramp to the bridge. If the ramp to Key Bridge remained closed during the morning peak period, the traffic congestion in this area might still back up onto GWMP, even with the longer deceleration lane.

Construction of a new off-ramp to Roosevelt Bridge with a connector to outbound US 50 (alternative C) would further compound problems at the off-ramp because an additional 500 vehicles per hour would be added during the morning peak period. Development of the US 50 connector would also require cooperation with the Virginia Department of Highways and Transportation because most of the land area is under the jurisdiction of the commonwealth of Virginia.

Congestion would continue under all alternatives at the major ramp junctions (where the ramps from GWMP and US 50 intersect I-66). The traffic flowing onto Roosevelt Bridge would exceed the capacity of the bridge. Consequently, the third lane improvements providing additional roadway capacity in alternatives C and D would not raise the level of service. However, the improvements in alternatives C and D would eliminate the queues for traffic approaching the off-ramp to Roosevelt Bridge. (These queues would be 2.3 miles under alternatives A and B.) Travel times on GWMP from a point north of Spout Run to Roosevelt Bridge would be progressively shorter for alternatives A through D.

Traffic flow during the evening peak hour would continue to be at or near the capacity of Roosevelt Bridge. Construction of a longer acceleration lane for the GWMP on-ramp from Roosevelt Bridge and relocation of the access to the parking area for Theodore Roosevelt Island (alternatives B and C) would facilitate merging and provide drivers with a safer area to merge. The addition of a third continuous lane would reduce congestion at the merge area. This should reduce rear-end collisions. However, during the evening peak hour, the merge would be made at a low level of service (E) under all of the alternatives.

Construction of a new third lane on outbound GWMP from the Key Bridge/Rosslyn on-ramp to Spout Run Parkway (alternative B) would facilitate merging and weaving. However, this would also result in the section of outbound GWMP north of Spout Run Parkway operating just below capacity.

Construction of new third and fourth lanes between the on-ramp from Key Bridge/Rosslyn and Spout Run Parkway (alternatives C and D) would facilitate merging and weaving on this outbound section. The number of rear-end and side-swipe accidents might be reduced by adding new lanes. However, the outbound section of GWMP north of Spout Run Parkway would be at or near capacity under these alternatives.

Construction of a short merge lane on outbound GWMP north of Spout Run Parkway (alternatives C and D) would facilitate weaving in the critical section prior to the outbound Spout Run Parkway exit. Evening peak-hour outbound travel times would be shorter in alternatives B and D than they are at present throughout the study area. Under alternative C travel times would be shorter than at present from the Key Bridge on-ramp to the north end of the study area, but travel times from the Roosevelt Bridge on-ramp would be longer.

The reconstruction of the Lorcom Lane/Spout Run intersection to allow left-hand turns (alternatives B, C, and D) would improve access to Lorcom Lane from Kirkwood (VA 124).

STUDY AREA TRAFFIC FLOWS

The projected weekday average traffic volumes for each alternative are presented in tables 19 and 20. The projected traffic volumes during the morning and evening peak hours are shown in tables 21 and 22. The figures in tables 21 and 22 are intended to represent future peak-hour use, but not necessarily the total peak-hour demand. Demand volumes and use volumes would be the same until they reached the capacity of a section of roadway or a ramp. The demand volumes could exceed the capacity, but the use volumes could not, since capacity is, by definition, the maximum number of vehicles that could use the roadway at any one time. Wherever demand exceeded capacity, backups would occur. The situations where this would be expected to happen are explained in the text for each alternative.

Alternative A

Inbound/Morning Peak Hour. In the absence of traffic signals at the Lorcom Lane/Spout Run intersection it would remain necessary to close outbound Spout Run west of Lorcom Lane during the morning peak period, making it impossible for outbound vehicles to travel directly to Lee Highway and outbound I-66.

At the critical junction of the Spout Run entrance to GWMP a police officer would still direct traffic and allocate the right-of-way. It is estimated that a maximum of 3,600 vehicles per hour (one vehicle per lane every two seconds) could pass through the intersection with this type of traffic control. If inbound GWMP received the right-of-way 80 percent of the time during the morning peak period, 2,900 vehicles per hour could pass through the intersection on GWMP and 700 vehicles per hour could pass through the intersection from inbound Spout Run Parkway. In spite of the restricted capacities of the roadways, inbound traffic on GWMP from I-495 near the Cabin John Bridge and from VA 123 would increase during the morning peak period, as would traffic on Spout Run Parkway. The length of the traffic queues north of Spout Run Parkway would increase from 2.3 miles to 2.4 miles.

The inbound off-ramp to Rosslyn Circle and Key Bridge would remain closed during the morning peak period; consequently, there would be no change from current operating conditions.

By 1990, 1,800 vehicles would attempt to use the off-ramp to Roosevelt Bridge during the morning peak hour, and by 2000 this demand would have increased to more than 2,000 vehicles. The theoretical capacity of the off-ramp is 2,000 vehicles per hour. However, because of the lane configuration of inbound I-66 onto the Roosevelt Bridge, traffic from the GWMP off-ramp must merge with through-traffic on inbound I-66 prior to the bridge entrance. Consequently, not all of the 1,800 to 2,000 vehicles attempting to exit GWMP would be able to pass through the junction with inbound I-66 during the morning peak hour. Traffic would back up on the ramp, and drivers attempting to use this ramp would experience

Table 19. Short-Term (1990) Projections of Weekday Average Daily Traffic on GWMP/Spout Run Parkway

Inbound	Existing (1984)	Projections for Alternatives A	B	C	D
GWMP from VA 123 to Spout Run	26,500	28,500	31,000	39,000	39,000
GWMP from Spout Run to off-ramp to Key Bridge/Rosslyn	35,000	37,500	42,000	50,000	50,000
GWMP from off-ramp to Key Bridge/Rosslyn to off-ramp to Roosevelt Bridge	27,500	29,500	34,000	39,000	30,000
GWMP from off-ramp to Roosevelt Bridge to on-ramp from US 50	20,000	20,500	25,000	31,500	24,000
On-ramp to Key Bridge/Rosslyn	7,500	8,000	8,000	11,000	11,000
Off-ramp to Roosevelt Bridge	7,500	9,000	9,000	8,500	6,500
Spout Run Parkway	8,500	9,000	11,000	11,000	11,000
[illegible]					
GWMP from on-ramp from Memorial Circle to on-ramp from Roosevelt Bridge	20,000	21,500	21,000	24,500	24,500
GWMP from on-ramp from Roosevelt Bridge to on-ramp from Key Bridge/Rosslyn	28,000	31,000	31,000	35,000	35,500
GWMP from on-ramp from Key Bridge/Rosslyn to Spout Run	42,000	46,000	48,000	52,000	52,500
GWMP from Spout Run to VA 123	30,500	33,500	36,000	36,000	36,500
On-ramp from Roosevelt Bridge	8,000	9,500	10,000	10,500	11,000
On-ramp from Key Bridge/Rosslyn	14,000	15,000	17,000	17,000	17,000
Spout Run Parkway	11,500	12,500	12,000	16,000	16,000

Source: Existing traffic volumes were derived from data collected by FHWA in June and July 1984 and rounded to the nearest 500 vehicles per day.

Table 20: Long-Term (2000) Projections of Weekday Average Daily Traffic on GWMP/Spout Run Parkway

	Existing	Projections for Alternatives			
Inbound	(1984)	A	B	C	D
GWMP from VA 123 to Spout Run	26,500	32,000	35,000	44,000	44,000
GWMP from Spout Run to off-ramp to Key Bridge/Rosslyn	35,000	42,000	47,000	56,000	56,000
GWMP from off-ramp to Key Bridge/Rosslyn to off-ramp to Roosevelt Bridge	27,500	33,000	38,000	43,500	33,500
GWMP from off-ramp to Roosevelt Bridge to on-ramp from US 50	20,000	21,000	26,000	32,500	25,000
Off-ramp to Key Bridge/Rosslyn	7,500	9,000	9,000	12,500	12,500
Off-ramp to Roosevelt Bridge	7,500	12,000	12,000	11,000	8,500
Spout Run Parkway	8,500	10,000	12,000	12,000	12,000
Outbound					
GWMP from on-ramp from Memorial Circle to on-ramp from Roosevelt Bridge	20,000	24,000	22,000	27,500	27,500
GWMP from on-ramp from Roosevelt Bridge to on-ramp from Key Bridge/Rosslyn	28,000	36,000	39,000	41,000	41,000
GWMP from on-ramp from Key Bridge/Rosslyn to Spout Run	42,000	52,000	55,000	57,000	57,000
GWMP from Spout Run to VA 123	30,500	38,000	41,500	38,000	38,000
On-ramp from Roosevelt Bridge	8,000	12,000	13,000	13,500	13,500
On-ramp from Key Bridge/Rosslyn	14,000	16,000	16,000	16,000	16,000
Spout Run Parkway	11,500	14,000	13,500	19,000	18,500

Source: Existing traffic volumes were derived from data collected by FHWA in June and July 1984 and rounded to the nearest 500 vehicles per day.

Table 21: Short-Term (1990) Projections of Peak-Hour Traffic on GWMP/Spout Run Parkway

Inbound/Morning Peak Hour (7:00-8:00)	Existing 1984)	Projections for Alternatives (vph) A	B	C	D
GWMP from VA 123 to Spout Run	2,750	2,900	2,950	4,000*	4,000*
GWMP from Spout Run to off-ramp to Key Bridge/Rosslyn	3,450	3,600*	3,750	5,600	5,700
GWMP from off-ramp to Key Bridge/Rosslyn to off-ramp to Roosevelt Bridge	3,450	3,600	3,750	3,600	2,800
GWMP from off-ramp to Roosevelt Bridge to on-ramp from US 50	2,150	1,800	1,850	1,650	1,400
Off-ramp to Key Bridge/Rosslyn	0**	0**	0**	1,250***	1,250***
Off-ramp to Roosevelt Bridge	1,300	1,800	1,900	1,700	1,400
Spout Run Parkway	700	700	800	1,600	1,700
Outbound Evening Peak Hour (5:00-6:00)					
GWMP from on-ramp from Memorial Circle to on-ramp from Roosevelt Bridge	1,900	1,700	1,500	1,650	1,650
GWMP from on-ramp from Roosevelt Bridge to on-ramp from Key Bridge/Rosslyn	3,000	3,100	3,000	3,300	3,300
GWMP from on-ramp from Key Bridge/Rosslyn to Spout Run	4,350	4,500*	4,800	5,100	5,100
GWMP from Spout Run to VA 123	3,250	3,350	3,700	3,850	3,850
On-ramp from Roosevelt Bridge	1,100	1,400	1,500	1,650	1,650
On-ramp from Key Bridge/Rosslyn	1,600	1,800*	1,800*	1,800*	1,800*
Spout Run Parkway	1,100	1,200	1,100	1,250	1,250

Source: Existing traffic volumes were derived from raw traffic count data collected by FHWA in June and July 1984 and rounded to the nearest 50 vehicles per hour.

* Represents maximum flow possible for lane configuration/traffic control/facility type.
** Closed to traffic 7:00 to 9:00 a.m.
***This figure assumes that GWMP off-ramp traffic is required to merge with traffic from North Lynn Street prior to crossing Key Bridge.

Table 22: Long-Term (2000) Projections of Peak-Hour Traffic on GWMP/Spout Run Parkway

Inbound Morning Peak Hour (7:00-8:00)	Existing (1984)	Projections for Alternatives (vph)			
		A	B	C	D
GWMP from VA 123 to Spout Run	2,750	2,900	3,150	4,000*	4,000*
GWMP from Spout Run to off-ramp to Key Bridge/Rosslyn	3,450	3,600*	4,000*	5,700	5,850
GWMP from off-ramp to Key Bridge/Rosslyn to off-ramp to Roosevelt Bridge	3,450	3,600	4,000	3,700	2,750
GWMP from off-ramp to Roosevelt Bridge to on-ramp from US 50	2,150	1,600	2,200	1,700	1,300
Off-ramp to Key Bridge/Rosslyn	0**	0**	0**	1,250***	1,250***
Off-ramp to Roosevelt Bridge	1,300	2,000*	2,000*	2,000*	1,450
Spout Run Parkway	700	700	850	1,700	1,850
Outbound Evening Peak Hour (5:00-6:00)					
GWMP from on-ramp from Memorial Circle to on-ramp from Roosevelt Bridge	1,900	1,650	1,500	1,700	1,900
GWMP from on-ramp from Roosevelt Bridge to on-ramp from Key Bridge/Rosslyn	3,000	3,250	3,250	3,700	3,700
GWMP from on-ramp from Key Bridge/Rosslyn to Spout Run	4,350	4,500*	5,050	5,500	5,500
GWMP from Spout Run to VA 123	3,250	3,350	3,950	3,950	4,000*
On-ramp from Roosevelt Bridge	1,100	1,600	1,750	1,800*	1,800*
On-ramp from Key Bridge/ Rosslyn	1,600	1,800*	1,800*	1,800*	1,800*
Spout Run Parkway	1,100	1,150	1,100	1,550	1,500

Source: Existing traffic volumes were derived from raw traffic count data collected by FHWA in June and July 1984 and rounded to the nearest 50 vehicles per hour.

*Represents maximum flow possible for lane configuration/traffic control/facility type.
**Closed to traffic 7:00 to 9:00 a.m.
***This figure assumes that GWMP off-ramp traffic is required to merge with traffic from North Lynn Street prior to crossing Key Bridge.

lengthy delays. In the year 2000 it would take approximately 23 minutes to travel from a point on GWMP north of Spout Run to the off-ramp for Roosevelt Bridge. Furthermore, the projected morning peak-hour demand for Roosevelt Bridge would exceed the capacity by approximately 1,350 vehicles by the year 2000. Projected demand volumes on the major inbound approaches to the bridge would be

	Vehicles per Hour	
	1990	2000
Ramp from GWMP to inbound I-66	1,800	2,000
Inbound I-66	2,200	2,300
Ramp from inbound US 50	2,600	3,050
Total	6,600	7,350

In comparison, the theoretical capacity of the bridge (with three lanes in each direction) would be only 6,000 vph in either direction. Consequently, it is likely that long queues would form at the bridge and back up on GWMP for 2.3 miles. Drivers approaching on inbound US 50 would also experience lengthy delays.

Outbound/Evening Peak Hour. By 1990 it is projected that the peak-hour traffic volume on outbound Roosevelt Bridge would be 5,400 vehicles per hour. Of that number approximately 1,400 vehicles would exit to the GWMP on-ramp, 2,000 would take outbound I-66, and 2,000 would exit onto outbound US 50. By the year 2000 the demand for outbound Roosevelt Bridge would be at capacity. Assuming that no capacity improvements were made to the bridge or to the Constitution Avenue/23rd Street signalized intersection, the maximum number of vehicles that could cross the three-lane bridge during the evening peak hour would be 6,000. It is projected that 1,600 vehicles would exit to the GWMP on-ramp, 2,400 would proceed on outbound I-66, and 2,000 would exit onto outbound US 50, as summarized below:

	Vehicles per Hour	
	1990	2000
On-ramp to GWMP	1,400	1,600
Outbound I-66/Rosslyn	2,000	2,400
On-ramp to US 50	2,000	2,000
Total	5,400	6,000

In the year 2000 it would take 8.5 minutes to travel from the on-ramp from Roosevelt Bridge to a point on GWMP north of Spout Run. The demand for the on-ramp from Key Bridge/Rosslyn would exceed the capacity of the ramp, causing backups to occur on the bridge. A maximum of 1,800 vehicles per hour could enter GWMP by way of this single-lane on-ramp.

Existing counts indicate that a maximum volume of 4,500 vph could travel through the section of outbound GWMP between Key Bridge and Spout Run in the absence of any structural changes. The projected evening peak-hour traffic would exceed the capacity of this section by approximately 550 vph by the year 2000. The projected evening peak-hour volumes for the approaches to this section of GWMP would be

	Vehicles per Hour	
	1990	2000
Outbound GWMP	3,100	3,250
On-ramp from Key Bridge/Rosslyn	1,800	1,800
Total	4,900	5,050

This excess demand would result in queues on the on-ramp that would not dissipate until after the evening peak hour. In the year 2000 it would take 4.4 minutes to travel from the Key Bridge on-ramp to a point on GWMP north of Spout Run. Beyond this critical bottleneck, it is projected that 1,150 vehicles would exit onto Spout Run Parkway during the evening peak hour and that 3,350 vehicles would continue on GWMP by the year 2000.

Alternative B

Inbound/Morning Peak Hour. Similar to alternative A, it would remain necessary to close outbound Spout Run west of Lorcom Lane during the morning peak period, thus restricting outbound traffic flow to Lee Highway and I-66.

The provision of an acceleration lane of adequate length to allow traffic on Spout Run Parkway to merge onto inbound GWMP would eliminate the need for a police officer to direct traffic at this critical junction during the morning peak period. The projected inflows to this critical junction would be

	Vehicles per Hour	
	1990	2000
Spout Run Parkway	800	850
Inbound GWMP	2,950	3,150
Total	3,750	4,000

The projected demand volume would reach the theoretical capacity of a two-lane directional facility by the year 2000. Any slight disruption to the traffic flow, such as an accident, would quickly create congestion and cause lengthy motorist delays. Traffic queues would not be expected on GWMP north of Spout Run Parkway; however, the queues on Spout Run Parkway would increase from 0.5 mile to 1.1 miles, which would extend beyond Lee Highway.

The ramp to Key Bridge would remain closed during the morning peak hour. Consequently, peak-hour traffic flow would not be affected at this location.

Similar to alternative A, congestion problems would still result at the junction of I-66 and the GWMP off-ramp to Roosevelt Bridge and at the junction of I-66 and the ramp from inbound US 50 because of inadequate capacity on the bridge. Queue lengths would be 2.3 miles, the same as in alternative A, at this location. In the year 2000 it would take 20 minutes to travel from a point on GWMP north of Spout Run to the Roosevelt Bridge off-ramp.

Outbound/Evening Peak Hour. The projected evening peak-hour demand for the outbound Roosevelt Bridge would exceed its capacity by the year 2000. As in alternative A, the maximum number of vehicles that could cross the bridge would be 6,000. The lengthened acceleration lane for the GWMP on-ramp from Roosevelt Bridge would facilitate the merge. It is projected that the number of vehicles using this ramp during the evening peak hour would increase to 1,500 vph by 1990 and 1,750 vph by 2000. In the year 2000 it would take 6.5 minutes to travel from the on-ramp from Roosevelt Bridge to a point on GWMP north of Spout Run Parkway.

Similar to alternative A, the projected demand for the on-ramp from Key Bridge/Rosslyn would exceed the capacity of the ramp, causing backups on the bridge. The projected evening peak-hour volumes on the section of GWMP between the on-ramp from Key Bridge/Rosslyn and Spout Run Parkway would be

	Vehicles per Hour 1990	Vehicles per Hour 2000
Outbound GWMP	3,000	3,250
On-ramp from Key Bridge/Rosslyn	1,800	1,800
Total	4,800	5,050

In the year 2000 it would take 2.6 minutes to travel from the on-ramp from Key Bridge to a point on GWMP north of Spout Run Parkway.

The evening peak-hour traffic exiting onto Spout Run Parkway would be 1,100 vph in both 1990 and 2000.

Alternative C

Inbound/Morning Peak Hour. The installation of traffic signals at the intersection of Lorcom Lane and Spout Run Parkway would eliminate the need to close outbound Spout Run west of Lorcom Lane during the morning peak period. Traffic signals would safely accommodate all vehicles turning at or proceeding through this intersection 24 hours a day, including outbound vehicles traveling directly to Lee Highway and outbound I-66 during the morning peak period. Elimination of the traditional free-flowing movement from Lorcom Lane to inbound Spout Run Parkway during the morning peak hours would create traffic queues on Lorcom Lane. No queues would occur on Spout Run Parkway. The periodic delays caused by signal phasing might be considered an inconvenience by local users, and the cars waiting at the intersection might be a nuisance to residents along Lorcom Lane, depending on the length of the queues.

Because of the additional capacity created by the new third inbound lane between Spout Run Parkway and the reconstructed and reopened off-ramp to Key Bridge, it is projected that the morning peak-hour volume on Spout Run Parkway would increase to 1,600 vph by 1990 and to 1,700 vph by 2000. The peak hour volumes on the inbound section of GWMP between Spout Run and Key Bridge would increase to 5,600 vehicles by the year 1990, and to 5,700 vehicles by the year 2000, as shown below:

	Vehicles per Hour 1990	Vehicles per Hour 2000
Spout Run Parkway	1,600	1,700
Inbound GWMP	4,000	4,000
Total	5,600	5,700

These volumes would be near the theoretical 6,000 vph capacity of a three-lane roadway. The projected peak-hour volumes for the off-ramp to Key Bridge would exceed the capacity by 1990, causing backups on GWMP. The capacity of the ramp would be 1,250 so long as GWMP off-ramp traffic was required to merge with traffic from North Lynn Street prior to crossing Key Bridge. A theoretical maximum of 2,000 vph could use the reconstructed and improved ramp if North Lynn Street was reduced to two lanes prior to the ramp junction and if the ramp traffic was unimpeded at the junction (that is, if it could cross Key Bridge in a continuous lane). Traffic queues up to 2.8 miles might develop on GWMP. In the year 2000 it would take 9.8 minutes to travel from a point on GWMP north of Spout Run Parkway to the Key Bridge off-ramp.

The projected morning peak-hour demand for the two-lane section of GWMP between Key and Roosevelt bridges would be 3,600 by 1990 and 3,700 by the year 2000. In the year 2000 it would take 10.9 minutes to travel from a point on GWMP north of Spout Run Parkway to the Roosevelt Bridge off-ramp.

As with alternatives A and B, congestion would still occur at the junctions of I-66 with the GWMP off-ramp to Roosevelt Bridge and with the ramp from inbound US 50. By the year 2000 the projected traffic volumes exiting the off-ramp to Roosevelt Bridge would be 2,000 vph. Of this, it is projected that only 500 vph would desire to use the new ramp to outbound US 50 and gain access to Rosslyn via this route. The new exit ramp to US 50 might attract some commuters to the parkway who currently use other routes through Arlington. This would potentially reduce the congestion at Rosslyn Circle during the morning rush hours compared to alternatives B and D. Also, routing traffic into Rosslyn by way of US 50 would provide better access to the larger commercial district of Arlington.

Outbound/Evening Peak Hour. As with alternative B the projected evening peak-hour demand on the outbound Roosevelt Bridge would exceed the capacity of the bridge by the year 2000. The lengthened acceleration lane for the GWMP on-ramp from Roosevelt Bridge would facilitate the merge. During the evening peak hour, 1,650 vehicles would attempt to enter GWMP from Roosevelt Bridge by 1990 and 1,800 vehicles would attempt to use the on-ramp by the year 2000. In the year 2000 it would take 7.4 minutes to travel from the on-ramp from Roosevelt Bridge to a point on GWMP north of Spout Run Parkway.

The projected demand for the on-ramp from Key Bridge/Rosslyn would exceed the capacity of the ramp, causing traffic backups on the bridge. A maximum of 1,800 vph could enter GWMP from this ramp during the evening peak hour. The added third and fourth lanes on outbound GWMP from the Key Bridge/Rosslyn on-ramp to the Spout Run exit would allow additional space and time for merging and changing lanes, and they would allow the on-ramp traffic desiring to exit at Spout Run to do so without weaving.

The peak-hour volumes on the section of outbound GWMP between the on-ramp from Key Bridge/Rosslyn and the Spout Run exit would be

	Vehicles per Hour	
	1990	2000
Outbound GWMP	3,300	3,700
On-ramp from Key Bridge/Rosslyn	1,800	1,800
Total	5,100	5,500

In the year 2000 it would take 2.6 minutes to travel from the on-ramp from Key Bridge to a point on GWMP north of Spout Run Parkway. The taper of three lanes to two just beyond the Spout Run exit would allow vehicles in the left-hand lane to stay on GWMP and to merge into the through-lanes beyond the Spout Run exit. The projected volume on the section of GWMP north of the Spout Run exit would be very close to the theoretical 4,000 vph capacity of that two-lane section.

Alternative D

Inbound/Morning Peak Hour. As with alternative C, the installation of traffic signals at the intersection of Lorcom Lane and Spout Run Parkway would eliminate the need to close outbound Spout Run west of Lorcom Lane during the morning peak period, but it would cause traffic queues on Lorcom Lane. Traffic signals would safely accommodate all vehicles turning at or proceeding through this intersection 24 hours a day. No queues would occur on Spout Run Parkway.

The construction of a third inbound lane from Spout Run Parkway to the off-ramp to the Roosevelt Bridge, the opening of a reconstructed off-ramp to Key Bridge, and the construction of a new off-ramp to Rosslyn and Fort Myer Drive would create a projected demand for inbound GWMP north of the Spout Run Parkway intersection that would exceed the capacity of the roadway by the year 1990. The maximum number of vehicles that could travel that section of roadway would be 4,000. Thus, the projected peak-hour inflows to the critical intersection between GWMP and Spout Run Parkway would be

	Vehicles per Hour	
	1990	2000
Spout Run Parkway	1,700	1,850
Inbound GWMP	4,000	4,000
Total	5,700	5,850

These volumes would be near the theoretical 6,000 vph capacity of a three-lane roadway.

It is projected that 900 vehicles would exit inbound GWMP onto the new ramp to Rosslyn and Fort Myer Drive during the morning peak hour in 1990 and that 1,100 vehicles would use that route in 2000. The construction of a new off-ramp into Rosslyn Circle would eliminate the Rosslyn Circle entrance into the Key Bridge Marriott and approximately 40 of the motel parking spaces. This would result in some confusion and inconvenience for customers who have traditionally used the circle entrance.

The demand for the reconstructed off-ramp to Key Bridge would exceed the capacity of a one-lane ramp even if there was an exclusive lane to accommodate this ramp traffic at the junction with Lynn Street. Not all of the morning peak-hour traffic arriving at the Key Bridge could be processed at the opposite end of the bridge during the morning peak hour. Traffic queues of 2.0 miles would occur on GWMP. In the year 2000 it would take 5.8 minutes to travel from a point on GWMP north of Spout Run Parkway to the Key Bridge off-ramp.

The projected morning peak-hour volumes exiting at the GWMP off-ramp to the Roosevelt Bridge would be 1,400 vph in 1990 and 1,450 vph in 2000. These volumes would be considerably less than the projected volumes on this ramp for alternatives A, B, and C, because a larger proportion of the total traffic accommodated on GWMP would exit at Key Bridge and Rosslyn. In the year 2000 it would take 6.1 minutes to travel from a point on GWMP north of Spout Run Parkway to the Roosevelt Bridge off-ramp.

Outbound Evening Peak Hour. As with alternatives B and C the evening peak-hour demand would exceed the capacity on outbound Roosevelt Bridge by the year 2000. Of the projected 6,000 vehicles crossing the bridge during the evening peak hour, approximately 1,650 would exit at the GWMP on-ramp in 1990 and 1,800 would use the ramp by the year 2000. Because the additional third lane would begin at this location, the vehicles entering GWMP would not have to yield and merge. In the year 2000 it would take 4.0 minutes to travel from the on-ramp from Roosevelt Bridge to a point on GWMP north of Spout Run Parkway.

As with alternatives A through C, the projected demands on outbound Key Bridge and on the on-ramp to GWMP would exceed the capacities of those facilities. A maximum of only 1,800 vph could enter GWMP from this ramp. The resulting evening peak-hour volumes on the critical outbound link of GWMP between the on-ramp from Key Bridge/Rosslyn and the Spout Run exit would be 5,100 vph in 1990 and 5,500 vph in 2000, the same as in alternative C. The added third and fourth lanes on outbound GWMP from the Key Bridge/Rosslyn on-ramp to the Spout Run exit would allow additional space and time for merging and changing lanes, and they would allow the on-ramp traffic desiring to exit at Spout Run to do so without weaving. In the year 2000 it would take 2.6 minutes to travel from the on-ramp from Key Bridge to a point on GWMP north of Spout Run Parkway.

The taper of three lanes to two on GWMP beyond the Spout Run exit would allow vehicles in the left-hand lane to stay on GWMP and to merge into the through-lanes beyond the Spout Run exit. By the year 2000, the evening peak-hour traffic on GWMP north of Spout Run Parkway would nearly reach the theoretical capacity of this two-lane outbound section.

The projected evening peak-hour volume on outbound Spout Run Parkway would be 1,250 in 1990 and 1,500 in 2000.

PROJECTED LEVELS OF SERVICE

Tables 23 and 24 present the projected morning and evening peak-hour levels of service* for each alternative. During the morning peak hour, the level of service would be very low on the off-ramp to Key Bridge/Rosslyn (if open) and in the vicinity of the off-ramp to Roosevelt Bridge, regardless of which alternative was implemented. The level of service would be improved at the junction of inbound GWMP and the Spout Run Parkway under alternative C, but the junction would remain capacity deficient under alternatives A, B, and D.

During the evening peak hours, the level of service would remain low for merging traffic under all of the alternatives at the junction of outbound GWMP and the on-ramp from Roosevelt Bridge and for all traffic at the intersection of Fort Myer Drive and the on-ramp for outbound GWMP. Actions in alternative D, particularly, and to a lesser extent in alternative C would improve the level of service on outbound GWMP between Key Bridge and Spout Run.

ACCIDENTS

Table 25 lists the relative accident potentials for each alternative. It is impossible to quantify the reduction in accidents that might occur from roadway improvements, but specific actions to improve the road surface, provide drivers with better information, reduce congestion, improve sight distances, and improve roadway geometrics would potentially reduce the number of accidents. Overall, roadway improvements would be expected to reduce accident-related injuries and property damage. Lower accident rates would also mean lower costs for vehicle repairs, medical services, and insurance rates.

In all alternatives, accidents would potentially be reduced at most of the locations listed in table 25 as a result of new reflective markings, guardrails, signing, and skid-resistant surfacing. The potential for accidents would additionally be reduced at specific locations as described below.

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* Levels of service are described in the "Description of the Environment."

Table 23: Projected Morning Peak-Hour Levels of Service, 1990 and 2000

Route Segment	1984 Existing Network	1990 Alternative				2000 Alternative			
		A	B	C	D	A	B	C	D
Inbound									
Lorcom Lane/Spout Run intersection									
Left turn from Lorcom Lane	A[1]	A[1]	A[1]	-	-	A[1]	A[1]	-	-
Total traffic	-	-	-	B	C	-	-	C	D
Junction of Spout Run Parkway and GWMP									
Total traffic	E[2]	F[2]	E	D	D	F[2]	E	D	E
Merging traffic	-	-	E	D	D	-	E	D	E
Junction of GWMP and off-ramp to Key Bridge/Rosslyn									
Diverging traffic	-[3]	-[3]	-[3]	E	E	-[3]	-[3]	E	E
Total traffic	D[1]	D[1]	D[1]	D	D	D[1]	E	D	E
Off-ramp to Key Bridge/Rosslyn	-[3]	-[3]	-[3]	F	F	-[3]	-[3]	F	F
Intersection of off-ramp from inbound GWMP and Lynn Street									
Crossing traffic from ramp	-[3]	-[3]	-[3]	-[3]	-[4]	-[4]	-[3]	-[4]	-[4]
Right-turning traffic from ramp	-[3]	-[3]	-[3]	E	E	-[3]	-[3]	E	E
Off-ramp to Roosevelt Bridge/ inbound I-66	F[5]	F	F	F	E	F	F	F	E
Junction of off-ramp from inbound GWMP and inbound I-66									
Merging traffic	E	F	F	F	F	F	F	F	F
Total traffic	D	F	F	F	F	F	F	F	F
Outbound									
Junction of on-ramp from Roosevelt Bridge and outbound GWMP									
Merging traffic	B	B	B	B	A	B	B	B	A
Total traffic	A	A	A	A	A	B	B	B	A
Intersection of Fort Myer Drive and on-ramp to outbound GWMP	A	B	B	B	C	B	B	C	C
Outbound GWMP from on-ramp from Key Bridge/Rosslyn to Spout Run									
Merging traffic	C	C	A	A	B	C	B	A	B
Diverging traffic	B	B	A	A	A	B	A	A	A
Total traffic	B	B	A	A	A	B	B	A	A

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1. Due to traffic control measures, this maneuver is unimpeded.
2. Due to traffic control measures, this intersection is treated as a two-phase signalized intersection.
3. Due to traffic control measures, traffic is not permitted on the ramp.
4. Movement would be prohibited.
5. Traffic on ramp is typically restricted during morning peak period due to traffic conditions at junction with I-66 and Roosevelt Bridge. By definition, level of service is F.

Table 24: Projected Evening Peak-Hour Levels of Service. 1990 and 2000

Route Segment	1984 Existing Network	1990 Alternative				2000 Alternative			
		A	B	C	D	A	B	C	D
Inbound									
Lorcom Lane/Spout Run intersection									
Left turn from Lorcom Lane	E	F	E	-	-	F	F	-	-
Total traffic	-	-	-	A	A	-	-	A	A
Junction of Spout Run Parkway and inbound GWMP									
Total traffic	B	C	C	B	B	C	C	B	B
Merging traffic	-	-	C	A	A	-	C	A	A
Junction of inbound GWMP and off-ramp to Key Bridge/Rosslyn									
Diverging traffic	B	B	C	B	C	C	D	B	C
Total traffic	B	C	C	B	B	C	C	B	B
Off-ramp to Key Bridge/Rosslyn	D[1]	D[1]	B	A	A	D[1]	C	B	B
Intersection of off-ramp from inbound GWMP and Lynn Street									
Crossing traffic from ramp	E	F	-[2]	-[2]	-[2]	F	-[2]	-[2]	-[2]
Right-turning traffic from ramp	D	E	B	B	B	F	B	B	B
Off-ramp to Roosevelt Bridge/inbound I-66	B	B	B	C	B	B	B	D	B
Junction of off-ramp from inbound GWMP and inbound I-66									
Merging traffic	B	C	C	C	D	D	D	D	D
Total traffic	A	C	C	C	C	C	C	C	C
Outbound									
Junction of on-ramp from Roosevelt Bridge and outbound GWMP									
Merging traffic	E	E	E	E	D	E	E	E	E
Total traffic	D	D	D	D	B	D	D	E	C
Intersection of Fort Myer Drive and the GWMP on-ramp	D	E	E	E	E	E	E	E	E
Outbound GWMP from on-ramp from Key Bridge/Rosslyn to Spout Run									
Weaving traffic	F	F	E	C	C	F	F	D	C
Merging traffic	F	F	-	-	-	F	-	-	-
Diverging traffic	F	F	-	-	-	F	-	-	-
Nonweaving traffic	F	F	E	C	D	F	F	D	D

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1. Low level of service is caused by ramp geometrics and not volume.
2. Movement would be prohibited.

Right-angle accidents between vehicles traveling outbound on Spout Run Parkway and vehicles turning left from Lorcom Lane onto inbound Spout Run should be reduced by the signalization of the Lorcom Lane/Spout Run Parkway intersection (alternatives C and D).

Because these alternatives would facilitate free-flow traffic conditions at the merge, the rear-end accidents on inbound GWMP near the junction with Spout Run Parkway should be reduced by the addition of a longer merge lane (alternative B) or a third continuous lane (alternatives C and D) for traffic entering GWMP from Spout Run Parkway. In alternatives C and D, the opening of the existing off-ramp to Key Bridge during the peak morning hours would result in backups on GWMP and stop-and-go traffic trying to use the ramp. As a result, rear-end and run-off-the-road accidents would potentially be more numerous than in alternative B.

Rear-end and run-off-the-road accidents at the off-ramp to Key Bridge/Rosslyn should be reduced by ramp improvements (alternative B). Accidents should be further reduced by providing alternative access to Rosslyn by way of a new ramp connecting to US 50 (alternative C). Even with this alternate access to Rosslyn, however, the morning peak-hour traffic trying to exit to Key Bridge would cause queues and stop-and-go traffic on this section of GWMP, so there would be little potential for improvement in accident rates during the morning rush hours. If a separate ramp for Rosslyn traffic exited GWMP near the Key Bridge exit (as would occur in alternative D), the potential for accidents would probably be higher than it would be if there was greater separation between the ramps (as would occur in alternative C).

Right-angle and sideswipe accidents at the intersection of the Key Bridge/Rosslyn off-ramp and North Lynn Street should be reduced by improvements to the ramp and to the traffic flow in Rosslyn Circle (alternatives B, C, and D). No right-angle and sideswipe accidents currently occur at this intersection during the morning rush hours because the ramp is closed between 7:00 and 9:00 a.m.

Rear-end accidents at the junction of outbound GWMP and the on-ramp from Roosevelt Bridge should be reduced by improved access to the Theodore Roosevelt Island parking lot (alternatives B, C, and D), a longer merge lane at the end of the ramp (alternatives B and C), and a new third continuous lane for merging traffic (alternative D).

Rear-end and sideswipe accidents at the junction of outbound GWMP and the on-ramp from Key Bridge/Rosslyn should be reduced by actions that would allow drivers more space for merging and changing lanes through this critical segment of the parkway. This would be accomplished by adding a new third lane (alternative B) or third and fourth lanes (alternatives C and D) to the section of outbound GWMP between Key Bridge and Spout Run. The accident potential would be lower under alternatives C and D because of the greater maneuvering width for merging and weaving provided by four lanes compared to three.

Table 25: Relative Accident Potentials

Location	Existing Conditions*	Alternative A	Alternative B	Alternative C	Alternative D
Inbound					
Lorcom Lane and Spout Run Parkway	Frequent number of right-angle accidents	Minor reduction in accidents as a result of resurfacing and rehabilitation	Same as A	Reduction in right-angle collisions	Same as C
Spout Run Parkway and inbound GWMP	Frequent number of rear-end accidents	Minor reduction in accidents as a result of resurfacing and rehabilitation	Some reduction in rear-end accidents over A	Same as B	Same as B
GWMP between Spout Run Parkway and off-ramp to Key Bridge	Frequent number of rear-end and run-off-the-road accidents	Minor reduction in accidents as a result of resurfacing and rehabilitation	Some reduction in all accidents over A	Additional minor reduction in accidents over B except during the peak hour	Same as A
Off-ramp to Key Bridge/Rosslyn	Frequent number of rear-end and run-off-the-road accidents	Minor reduction in accidents as a result of resurfacing and rehabilitation	Some reduction in all accidents over A	Additional minor reduction in accidents over B except during the peak hour	Same as C
Key Bridge off-ramp and Lynn Street	Frequent number of right-angle and sideswipe accidents	Same as existing conditions	Some reduction in all accidents over A	Same as B except during the peak hour	Same as C
Outbound					
On-ramp from Roosevelt Bridge	Frequent number of rear-end accidents	Minor reduction in accidents as a result of resurfacing and rehabilitation	Some reduction in rear-end accidents over A	Same as B	Same as B
On-ramp from Key Bridge/Rosslyn at Fort Myer Drive	Frequent number of rear-end accidents	Same as existing conditions	Some reduction in all accidents over A	Same as B	Same as B
GWMP at on-ramp from Key Bridge/Rosslyn	Frequent number of rear-end and sideswipe accidents	Minor reduction in accidents as a result of resurfacing and rehabilitation	Some reduction in all accidents over A	Additional minor reduction in accidents over B	Same as C
Spout Run Parkway	Frequent number of run-off-the-road accidents	Minor reduction in accidents as a result of resurfacing and rehabilitation	Same as A	Same as A	Same as A

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*See table 10 for numbers of accidents.

Run-off-the-road accidents on Spout Run Parkway should be reduced by the improvement of grades and curves (all alternatives).

REGIONAL IMPACTS

When examined from the perspective of the entire Washington metropolitan area, the five alternatives would have an almost negligible impact on regional vehicle miles of travel and regional vehicle hours of travel. An estimated 10 million vehicle miles of travel would occur during a peak hour under each alternative. The maximum difference in regional miles of travel between any of the alternatives would be less than 0.05 percent. In regional miles, an estimated 300,000 vehicle hours of travel would occur during a peak hour under each alternative.

CONSULTATION AND COORDINATION

RELATED STUDIES BY OTHER AGENCIES

Alterations to GWMP between Spout Run Parkway and Roosevelt Bridge have been considered on a number of occasions, and several technical studies and plans have been prepared. In 1967 the U.S. Bureau of Public Roads (now the Federal Highway Administration) prepared plans for widening, paving, and ramp relocation (project 1A31). In 1972 the FHWA followed up on that project with a report and plan containing six alternatives. In 1978 the FHWA prepared a two-volume accident report on the parkway. Changes to the Lorcom Lane/Spout Run Parkway intersection have also been studied. In 1980 the Arlington County Department of Public Works completed an assessment of alternatives for Lorcom Lane between North Edgewood Street and Spout Run Parkway. This study assessed the traffic and accidents at the intersection, then analyzed various alternatives and made recommendations for modifying the intersection. Selected information and proposals from these previous studies were incorporated into this environmental impact statement.

CONSULTATION AND COORDINATION IN THE PREPARATION OF THE DEIS

Work on the NPS study began in January 1984. An informational meeting was held in Arlington, Virginia, in February to brief various area jurisdictions regarding the study and to hear their ideas and concerns. A notice of intent to prepare an environmental impact statement was published in the Federal Register on March 14, 1984.

The Federal Highway Administration, the Virginia Department of Highways and Transportation, the Arlington County Department of Public Works, and the District of Columbia Department of Public Works were invited to participate as coordinating agencies in the development of the EIS. All four agencies provided input to the study area issues and the preliminary alternatives, both during project scoping and through the production of the draft EIS. The Federal Highway Administration, Eastern Direct Federal Division, Arlington, Virginia, provided cross sections and cost estimates for each EIS alternative, furnished data collected from periodic traffic counts within the study segment, and developed a contour map of the Little River shoreline. The Virginia Department of Highways and Transportation and the District of Columbia Department of Public Works made specific recommendations regarding the study area. The Virginia Department of Highways and Transportation generally favored alternative D, full-time access to Key Bridge, and possible establishment of HOV restrictions on the GWMP off-ramp to Roosevelt Bridge. The District of Columbia Department of Public Works recommended adding a third lane outbound between Roosevelt Bridge and Spout Run, reconfiguration of the GWMP off-ramp to Key Bridge to permit morning peak-hour access to Rosslyn, improvement to Rosslyn Circle, and adding a third lane inbound between Spout Run and Key Bridge.

Other agencies and organizations that were involved in the study included the National Capital Planning Commission, which assisted in the distribution of an informational brochure and commented on the alternatives.

Bellomo-McGee, Inc., traffic engineering consultants from Vienna, Virginia, were contracted to provide traffic forecasts for each alternative, traffic safety recommendations, an analysis of air quality and noise, and an analysis of traffic weaving patterns outbound between Key Bridge and Spout Run Parkway.

The Washington Metropolitan Area Council of Governments was contracted to provide socioeconomic data and travel and employment assumptions for the region using the latest and most up-to-date "Round 3" forecasts. These forecasts are based on 1980 census data and are composited by information compiled by each member COG jurisdiction.

The U.S. Fish and Wildlife Service was consulted to determine the status of endangered or threatened wildlife and plant species within the parkway. They were also consulted to determine the impacts of construction on the Potomac River wetlands.

PUBLIC INVOLVEMENT

An informational brochure was prepared in April 1984, and more than 2,000 copies were distributed to the public. Between April 25 and May 2 public scoping meetings were held in McLean, Reston, Arlington, Bethesda, and the District of Columbia. A total of 65 persons attended the five meetings. Most of those who attended represented either themselves, a neighborhood association, or a conservation group. Following the introductory presentations by the National Park Service, the public broke into small groups to discuss and record their concerns. In addition to attending public meetings, the public was invited to send in comments using the mail-back comment sheet provided in the brochure. The comment period was from April 7 to July 7, 1984. During that period the National Park Service received 69 written responses: 43 responses from individuals, 13 from government offices, 11 from neighborhood associations, and 2 from vanpool groups. Approximately 80 percent of these responses contained specific and often very substantive comments. The written comments reflected many of the same concerns and ideas recorded at the public meetings, but generally went into greater detail about specific options to resolve the problems. Both public meeting and written comments are summarized below.

> General: One observation expressed repeatedly by individuals was that traffic volumes on GWMP had declined since I-66 had opened and that congestion was not a major problem, especially compared to the traffic congestion on other major roads. Lower inbound volumes were particularly noted. The people who made these comments were cautious about supporting any major construction changes. Those who did support construction alternatives generally supported the

minimum changes necessary to resolve problems in specific locations in the study area (see the discussion under "Construction Options").

HOV/Ridesharing: In general, HOV restrictions were strongly opposed for the following reasons:

> The irregular work schedules of many commuters prevent them from carpooling.
>
> Traffic shifts would further congest other roads (both neighborhood and major arteries).
>
> HOV restrictions would be confusing to tourists.
>
> The access into the District provided by GWMP has been a major incentive for some of the individuals and companies who have located in Fairfax and Montgomery counties.
>
> The mass transit systems are inadequate in parts of Fairfax and Montgomery counties.
>
> There would be no alternative routes for non-carpoolers because of the HOV restrictions on I-66.

Voluntary ridesharing, on the other hand, was considered a very acceptable alternative by the majority. Several suggestions were made on how to accomplish this:

> Advertise vanpool information along the parkway (783-Pool).
>
> Provide park-and-ride facilities near access points along the parkway.
>
> Bring the subway out to Tyson's Corner and Dulles Airport.
>
> Increase the number of buses, bus stops, and frequency of bus service in the suburbs.

Spout Run Parkway: Several respondents opposed the closure of Spout Run Parkway because they felt it gave undue preference to Fairfax and Montgomery county commuters at the expense of Arlington residents. Some felt that by eliminating Spout Run traffic even more commuters from the outlying suburbs would be encouraged to use GWMP and eventually congestion would return. Several persons voiced their concern that diverted Spout Run traffic would cause additional congestion and safety problems on Lee Highway. Several Arlington residents also were strongly against installing traffic lights at Lorcom Lane or GWMP. Another suggestion was to remove the U.S. Park Police officer and allow the inbound left lane of GWMP to keep moving while using the right lane as a merge area for Spout Run traffic.

Other Traffic Management Ideas and Comments: The following is a range of other traffic management ideas expressed by various respondents:

Encourage government and nongovernment offices to stagger work hours further to spread out the commuting period.

Improve mass transit alternatives.

Impose a commuter use-fee during rush hour periods. This might involve setting up collection points or requiring the purchase of commuter stickers.

Establish "queue jumpers" for vehicles with two or more occupants, especially at constrictive points such as Spout Run and Lorcom Lane.

Close GWMP inbound at VA 123 in the morning.

Close the Key Bridge ramp during the evening rush hour.

Decrease HOV-3 to HOV-2 on I-66.

Remove HOV restrictions from I-66 and 395.

Study peak-hour reversible lanes (all lanes one-way or one lane switched in direction of rush hour traffic).

Improve Canal Road and MacArthur Boulevard to encourage traffic to stay on the Maryland side of the river.

Construction Options: The responses received concerning construction options were mixed. However, certain concerns were consistently raised during the public meetings regarding construction alternatives. They focused on the effectiveness of construction alternatives within the context of regional problems. Specifically, several individuals were concerned that widening the parkway might only temporarily ease traffic congestion and actually create more traffic demand. Some felt that the limitations of the bridges and the District arterials would continue to create traffic bottlenecks which would negate any benefits from road widening. One participant voiced his opinion that traffic problems would always exist because the metropolitan area continues to grow and generate more traffic.

Many people, both in writing and at the meetings, supported some level of construction. The construction options recommended by participants focused primarily on improving specific problem areas. Roadway resurfacing was commonly supported. Also, it was recommended that the double weave problem on outbound GWMP between the Key Bridge on-ramp and the Spout Run exit be solved. One person recommended widening the Key Bridge on-ramp.

Another suggestion was to improve the Roosevelt Bridge on-ramp to provide enough room for traffic to merge. For inbound morning traffic, one participant suggested lengthening the off-ramp to the Roosevelt Bridge. Additional construction alternatives suggested by individuals included adding a lane inbound between Spout Run Parkway and Roosevelt Bridge and widening Roosevelt Bridge.

Safety: The majority of participants endorsed the concept of enhancing the safety of the roadway. The following specific options were suggested:

Provide reflective striping on both parkways.

Groove the roadway for better traction.

Lower the speed limit.

Improve speed zone enforcement.

Improve the roadbed surface.

Improve lighting along the parkway.

Provide road shoulders.

The Environment: The majority of respondents expressed concern for the environmental and scenic qualities of GWMP. In general they all wanted to maintain the aesthetic qualities of the parkway regardless of the alternative chosen. The following concerns were expressed:

The parkway is one of the most beautiful entrances to a capital city in the world.

The beauty of the parkway is important to the quality of life in the Washington area.

The beauty of the parkway is more valuable than its use as a commuter road.

Widening the parkway would conflict with air quality control efforts in this region.

The beauty of the Potomac River waterfront and palisades would be damaged by widening the parkway.

Widening the parkway in one section would open the door someday to widening the rest of the parkway.

The natural resources of the parkway, such as the trees, streams, and wildlife habitat, should be preserved.

The vistas of the river and the monuments should be maintained.

The waterfront values and safe access to Theodore Roosevelt Island should be protected.

Recreation: Those who commented on recreation options generally expressed a desire to see better pedestrian and bicycle access to the riverfront from Arlington.

A complete copy of all written and verbal comments is available at the parkway headquarters building at Turkey Run, Virginia.

AGENCIES AND ORGANIZATIONS TO WHOM COPIES OF THE DEIS HAVE BEEN SENT

Federal Agencies

- Advisory Council on Historic Preservation
- Central Intelligence Agency
- Commission of Fine Arts
- Department of Agriculture
  - Soil Conservation Service
- Department of the Army
  - Corps of Engineers
- Department of the Interior
  - Fish and Wildlife Service
- Department of Transportation
  - Federal Highway Administration
- Environmental Protection Agency
- General Services Administration
- Federal Emergency Management Agency
- National Capital Planning Commission

State Agencies

- Maryland State Clearinghouse
  - Department of Natural Resources
  - Department of State Planning
  - Department of Transportation
  - Historic Preservation Officer
  - National Capital Park and Planning Commission
- Virginia State Clearinghouse
  - Air Pollution Control Board
  - Council on the Environment
  - Department of Highways and Transportation
  - Division of Parks and Recreation
  - Historic Landmarks Commission

Local Agencies

Arlington County
- County Board
- Department of Public Works
- Environmental Improvement Commission
- Parks Division
- Planning Division
- Transportation Commission

Alexandria
- Office of Community Development
- Office of Transportation and Environmental Services

Fairfax County
- County Executive
- Office of Comprehensive Planning
- Office of Transportation

Metropolitan Washington Council of Governments

Montgomery County
- County Council
- Office of Management and Budget
- Planning Board

Northern Virginia Planning District Commission

Northern Virginia Transportation Commission

Washington, D.C.
- City Administrator
- Department of Public Works
- Department of Recreation
- Historic Preservation Officer
- Mayor's Office
- Office of the Budget
- Office of Planning

Washington Metropolitan Area Transit Authority

APPENDIX A: CONSTRUCTION COST ESTIMATES

The following cost estimates are in 1985 dollars and include the costs of preliminary engineering and construction engineering and supervision. Annual maintenance costs are not included.

To maintain traffic flow during construction, it may be necessary to construct at night. This would result in an approximate 30 percent increase in cost estimates regardless of the alternative.

Alternative A

Item	Cost
Removal of curb and pavement (67,000 sq yd)	$ 1,875,000
Pavement (67,000 sq yd)	2,000,000
Curb (55,000 lin ft)	1,125,000
Drainage (LS)	500,000
Traffic control (LS)	625,000
Stabilize Spout Run embankment (LS)	625,000
Mobilization (LS)	500,000
Miscellaneous (CS)	1,500,000
Landscaping (LS)	1,519,000
Total	$10,269,000

Alternative B

Item	Cost
Removal of curb and pavement (67,000 sq yd)	$ 1,875,000
Earthwork (18,000 cu yd)	375,000
Pavement (78,000 sq yd)	2,375,000
Curb (55,000 lin ft)	1,125,000
Retaining walls (31,000 sq ft)	2,500,000
Drainage (LS)	750,000
Traffic control (LS)	1,000,000
Bridge (LS)	313,000
TRI parking area* (3,000 sq yd)	125,000
Stabilize Spout Run embankments (LS)	625,000
Mobilization (LS)	625,000
Miscellaneous (CS)	2,063,000
Landscaping (LS)	2,763,000
Total	$16,513,000

---

*Cost of parking area only, does not include other site plan improvements.

Alternative C

Item	Cost
Removal of curb and pavement (67,000 sq yd)	$ 1,875,000
Earthwork (27,000 cu yd)	625,000
Pavement (90,000 sq yd)	2,625,000
Curb (55,000 lin ft)	1,125,000
Retaining walls (53,000 sq ft)	4,125,000
Drainage (LS)	750,000
Traffic control (LS)	1,250,000
Bridge (LS)	625,000
TRI parking area* (3,000 sq yd)	125,000
Stabilize Spout Run embankment (LS)	625,000
Mobilization (LS)	750,000
Miscellaneous (CS)	2,500,000
Landscaping (LS)	4,669,000
Total	$21,669,000

Alternative D

Item	Cost
Removal of curb and pavement (67,000 sq yd)	$ 1,875,000
Earthwork (42,000 cu yd)	875,000
Pavement (100,000 sq yd)	3,125,000
Curb (55,000 lin ft)	1,125,000
Retaining walls (120,000 sq yd)	9,375,000
Drainage (LS)	875,000
Traffic Control (LS)	1,750,000
Bridge (LS)	625,000
TRI parking area* (3,000 sq yd)	125,000
Stabilize Spout Run embankment (LS)	625,000
Mobilization (LS)	1,000,000
Miscellaneous (CS)	3,625,000
Landscaping (LS)	6,813,000
Total	$31,813,000

---

*Cost of parking area only, does not include other site plan improvements.

APPENDIX B: METHODOLOGY USED FOR THE TRAFFIC IMPACT ANALYSIS

Methodology

The procedures used to analyze impacts on the transportation network were adapted from the ongoing regional transportation planning process conducted by the Metropolitan Washington Council of Governments. Basic data were supplied by COG for the years 1980 and 2000; the data were refined for the analysis of existing (1984) conditions and for the short-term (1990) and long-term (2000) forecasts of the effects of the proposed alternatives.

COG is responsible for developing a regional transportation plan under the requirements of the Federal-Aid Highway Act of 1962 and the Urban Mass Transportation Act of 1964. By terms of this legislation the process must be a comprehensive, continuing, and coordinated transportation planning process, often referred to as the "3-C" transportation planning process. The National Capital Region Transportation Planning Board sets the policy for the plan and ultimately adopts the approved plan for the region.

The long-range element of the "Long Range Transportation Plan for the National Capital Region" was adopted by the Transportation Planning Board on May 21, 1980. A technical assessment of the long-range plan for the year 2000 was subsequently completed in December of 1982. The analysis process applied in this study was based on the adopted long-range plan and the findings in the 1982 systems level reevaluation.

The Analysis Process. A computer modeling technique similar to that used by COG was used for the GWMP traffic analysis. Several of the available transportation planning computer programs were evaluated, and the Urban Transportation Planning System (UTPS), developed and supported by the U.S. Department of Transportation, was selected. It has been successfully used by transportation planners and engineers during the past decade and is generally accepted by the profession for long-range forecasts and for use in environmental impact statements.

The UTPS typically incorporates a four-step process of determining

trip generation (the number of trips for various purposes that originate within different parts of a region)

trip distribution (destination of trips)

modal split (the transportation modes--auto, truck, high-occupancy vehicle, bus, train, bicycle, etc.--used for the trips)

trip assignment (the routes used for the trips)

Preliminary estimates for the first three factors were provided by COG, based on projections about the distribution of population and employment. To gather the data necessary for ongoing land use projections, COG has divided the Washington metropolitan region into 200 analysis districts containing 1,345 analysis zones. Working with the cooperating agencies of the local jurisdictions, COG has developed a range of forecasts about the future land use patterns of each district and zone. These forecasts are based on alternative assumptions about low, intermediate, or high levels of future growth. The most recently adopted forecasts are the "Round III" forecasts published by COG in 1984. The assumption of intermediate growth was selected for the assessment of both the short-term and long-term impacts of the GWMP alternatives. COG used these land use data to estimate the daily number of trips originating in each district and zone, and then appropriate modeling techniques were used to determine the modes and destinations of the trips. COG produced a series of matrices showing the number of daily vehicle trips made between each pair of districts, further broken down according to the following trip types: home-based low-occupancy auto work trips, home-based high-occupancy vehicle work trips, home-based auto nonwork trips, truck trips, and miscellaneous trips.

The determination of which routes would be used for these trips required the development of a composite baseline highway network. The COG year 2000 district-level and zonal-level highway networks were used to develop the baseline network. All of the assumptions regarding the completion of the transportation facilities listed above were included except as noted in the discussion. The number and type of highway facilities incorporated into the baseline network depended on the location of the analysis unit. Only the major roadways were included in the outlying analysis units, while the complete roadway system was analyzed within the EIS study area. The resulting baseline network contained a total of approximately 5,300 directional highway links. Modifications were then made to the baseline network to create three alternative networks corresponding to alternatives B, C, and D.

The year 2000 district-to-district daily trip tables were also modified. First, the daily trip matrices were adjusted to develop daily trip tables for the 320 analysis units rather than the 200 districts. The smaller analysis units were all inside the beltway and consisted mainly of COG analysis zones and subzones in the Rosslyn area. Trips to and from the 18 districts were allocated to the 138 zones and subzones on the basis of socioeconomic characteristics.

The modified morning and evening peak-hour trip tables for miscellaneous, nonwork, and auto work trips were combined and then assigned to the baseline highway network and the alternative B, C, and D networks using an all or nothing assignment algorithm. High-occupancy-vehicle work trips were then assigned using a capacity-restraint algorithm. The restrictions on certain network links (for example, no trucks, HOVs during morning or evening peak hour, no traffic during the morning peak hour) were included in the model. The resulting computer assignments were manually reviewed, and necessary adjustments were then made to develop the traffic projections. Projected peak-hour volumes for 1990 for 50 critical links were derived by an interpolation of existing (1984) traffic volumes and the year 2000 projections.

Conversion of Data. The Metropolitan Washington COG data, which are formatted to provide information for the 24-hour period only, had to be reformulated to provide data for morning and evening peak-hour travel. To accomplish this, factors were developed to reflect what percentages of different kinds of daily trips were made during the morning and evening peak hours.

The treatment of high-occupancy-vehicle trips also posed a potential problem. The COG trip tables were developed assuming an HOV-4 requirement instead of the HOV-3 requirement currently enforced on I-66. Data provided by the Virginia Department of Highways and Transportation revealed that vehicular traffic on I-66 during the peak hour has increased substantially since January 1984 when HOV-3 went into effect. On the basis of the best available data, it appears that the vehicular traffic on I-66 is two to four times higher with HOV-3 relative to the period when HOV-4 was in effect. For analysis purposes it was assumed that HOV-3 would be in effect on I-66 in the future, and adjustments were made accordingly.

APPENDIX C: CONSULTATION WITH THE U.S. FISH AND WILDLIFE SERVICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
DIVISION OF ECOLOGICAL SERVICES
1825B VIRGINIA STREET
ANNAPOLIS, MARYLAND 21401

October 16, 1984

Mr. Gerald D. Patten
National Park Service/Denver Service Center
755 Parfet Street
P.O. Box 25287
Denver, CO 80225

Dear Mr. Patten:

This responds to your September 27, 1984 request for information on the presence of Federally listed endangered or threatened species within the area to be affected by the George Washington Memorial Parkway between Spout Run and Theodore Roosevelt Bridge (Package 836) in Arlington County, Virginia.

Except for occasional transient individuals, no Federally listed or proposed endangered or threatened species are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 Consultation is required with the Fish and Wildlife Service (FWS). Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to endangered species under our jurisdiction. It does not address other FWS concerns under the Fish and Wildlife Coordination Act or other legislation.

Thank you for your interest in endangered species. If you have any questions or need further assistance, please contact Andy Moser of our Endangered Species staff at (301) 269-6324.

Sincerely yours,

Geo A. Moser

for Glenn Kinser
Supervisor
Annapolis Field Office

GLOSSARY

average daily traffic (ADT)
the total volume of traffic during a given period of time greater than one day and less than one year, divided by the number of days in that time period

capacity
the maximum number of vehicles per unit of time that can be accommodated by a particular roadway segment under the prevailing roadway and traffic conditions

diverging
a single stream of traffic dividing into two separate streams

level of service
a qualitative measure of traffic flow along a roadway or through an intersection represented by a rating between A and F, with A representing little or no delay and F representing extreme congestion

merging
two separate streams of traffic combining to form a single stream

queue
a line of vehicles waiting in a congested lane or on a congested ramp

queue length
the theoretical length of a queue, in this study based on a vehicle density of 100 vehicles per mile per lane

travel time
the running and delay time required to traverse a specified route

weaving
the crossing of traffic streams moving in the same general direction, accomplished by merging and diverging

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As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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